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**AIR POLLUTION
ABSTRACTS
26767--27293**

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**Prepared by
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CONTENTS

Introduction	3
APTIC Publications	5
Recent Contract Awards	6
Subject Fields and Scope Notes	8
Abstract Bulletin	11
Subject Index	SI-1
The terms that most closely describe the information presented in the documents are arranged alphabetically.	
Author Index	AI-1
Personal authors are arranged alphabetically. The names are presented last name first. When the author is a primary author an asterisk precedes the Abstract Number.	

INTRODUCTION

This periodical is intended to inform personnel of the Environmental Protection Agency (EPA), and others who are also professionally interested in air pollution, of selected technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given.

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As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of the lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching ---more than those included in the subject index in each issue. Feedback from our users, including suggestions of articles for abstracting, are always welcome.

APTIC Publications

- Odors and Air Pollution: A Bibliography with Abstracts*, October 1972, GPO No. EP 4.9:113, \$3.00.
- Mercury and Air Pollution: A bibliography with Abstracts*, October 1972, GPO No. EP 4.9:114, \$1.25.
- Air Pollution Aspects of Emission Sources: Petroleum Refineries - A Bibliography With Abstracts*, July 1972, GPO No. EP 4.9:110, \$1.25.
- Air Pollution Aspects of Emission Sources: Iron and Steel Mills - A Bibliography With Abstracts*, May 1972, GPO No. EP 4.9:107, \$1.00.
- Air Pollution Aspects of Emission Sources: Boilers - A Bibliography With Abstracts*, May 1972, GPO No. EP 4.9:105, \$2.00.
- Hydrochloric Acid and Air Pollution: An Annotated Bibliography*, July 1971, GPO No. EP 4.9:100, \$0.55.
- Chlorine and Air Pollution: An Annotated Bibliography*, July 1971, GPO No. EP 4.9:99, \$0.55.
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- Air Pollution Aspects of Emission Sources: Cement Manufacturing - A Bibliography With Abstracts*, May 1971, GPO No. EP 4.9:95, \$0.50.
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- Air Pollution Aspects of Emission Sources: Municipal Incineration - A Bibliography With Abstracts*, May 1971, GPO No. EP 4.9:92, \$1.00.
- Photochemical Oxidants and Air Pollution: An Annotated Bibliography (2 Volumes)*, March 1971, GPO No. EP 4.9:88, \$6.25.
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- Municipal Incineration: A Review of Literature*, June 1971, GPO No. EP 4.9:79, \$1.00.
- Hydrocarbons and Air Pollution: An Annotated Bibliography (2 Volumes)*, October 1970, GPO No. HE 20.1309:75, \$5.00.
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- Air Pollution Translations: A Bibliography With Abstracts Volume I*, May 1969, GPO No. FS 2.93/3:56, \$1.75.
- Air Pollution Translations: A Bibliography With Abstracts Volume II*, April 1970, GPO No. HE 20.1309:69, \$1.00.
- Carbon Monoxide, A Bibliography With Abstracts*. 1966, GPO No. PHS 1503, \$2.50.

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Contract No. 68-02-0768, RFP No. Du-72-B860 \$1,949,034
DEVELOPMENT AND OPERATION OF A MOBILE CLINICAL LABORATORY TO
STUDY EFFECTS OF ENVIRONMENTAL POLLUTANTS (CLEVER) AND
DEVELOPMENT OF EXPOSURE FACILITIES AND PHYSIOLOGIC DATA
ACQUISITION SYSTEMS FOR STUDIES OF HEALTH EFFECTS OF ENVIRON-
MENTAL CONTAMINANTS (CLEANS).

Computer Sciences Corporation, 6565 Arlington Blvd., Falls Church, Virginia 22046

Contract No. 68-02-0224, Modification No. 1..... \$269,757
DEFINITION OF THE MECHANISM AND KINETICS OF COMBUSTION/POLLUTANT
FORMATION WITH EMPHASIS ON COMBUSTION MODIFICATION
TECHNIQUES.

Esso Research and Engineering Company, Post Office Box 8, Linden, New Jersey 07036

Contract No. 68-02-1004, RFP No. Du-73-A120..... \$39,541
UPGRADING & UPDATING AREA & POINT SOURCE INVENTORIES FOR CALIFOR-
NIA.

Pacific Environmental Services, Inc., 2932 Wilshire Boulevard, Suite 202, Santa Monica,
California 90403

Contract No. 68-02-1026, RFP No. Du-73-A037..... \$63,608
REGIONAL AIR POLLUTION SURVEY EMISSION INVENTORY.

Stanford Research Institute, 333 Ravenswood Avenue, Menlo Park, California 94025

Contract No. 68-02-1068, RFP No. Du-72-A116..... \$63,639
SYSTEMS ANALYSIS OF INDUSTRIAL ODOR CONTROL METHODS.

Foster D. Snell, Inc., General Laboratories, Hanover Road, Florham Park, New Jersey 07932

Contract No. 68-02-0654, Modification No. 3..... \$37,615
DESIGN AND FABRICATION OF A TRAILER VAN LABORATORY SHELL.

Thermo-Systems, Incorporated, 2500 Cleveland Avenue, North, St. Paul, Minnesota 55113

Contract No. 68-02-1117, RFP No. Du-73-C739..... \$28,570
SOLAR 225 KW GAS TURBINE GENERATOR SET, No. 204.

Solar Division of International Harvester Company, c/o Alley Associates, Inc., Post Office
Box 11427, Charlotte, North Carolina 28209

Contract No. 68-02-0761, RFP No. Du-73-B380..... \$59,565
SCANNING ELECTRON MICROSCOPE EXAMINATIONS OF THE IN VIVO EFFECTS
OF AIR POLLUTANTS ON PULMONARY SYSTEMS.

IIT Research Institute, 10 West 35th Street, Chicago, Illinois 60616

Contract No. 68-02-1122, RFP No. Du-73-C785 \$51,594
TEST GASOLINE DELIVERED IN TANK CARS SUITABLE FOR LONG-TERM
STORAGE.

Phillips Petroleum Company, Special Products Division, Bartlesville, Oklahoma 74004

Contract No. 68-02-0757, RFP No. Du-73-B387 \$95,093
DEVELOPMENT OF A GAS LASER SYSTEM TO MEASURE TRACE GASES BY
LONG PATH ABSORPTION TECHNIQUES.

General Electric Company, Ordnance Systems, 100 Plastics Avenue, Pittsfield, Massachusetts
01201

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry--e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere. Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS--HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS--PLANTS AND LIVESTOCK

Effects on vegetation--crops, trees, other plants--and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS--MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

1973

26767

APTIC NO. 48478

THE PRODUCTION OF AEROSOLS BY VEGETATION. (Erzeugung von Aerosolen durch die Vegetation). Text in German. *Naturw. Rundschau*, 26(1):31-32, 1973. 4 refs.

The blue haze which is frequently noticed over trees and mountain ridges might be due to the wax found on the surface of the leaves. These waxes consist of alkanes, alcohols, acids (usually in the form of esters), polymerized aldehydes and ketones. At the application of an electric voltage the wax is split off in form of a brush discharge. The local voltage gradient in a tree may reach several 1000 volts/m if an electrified cloud passes over it. This observation points to the fact that wax particles of a size suitable for producing the blue haze are produced by natural forces. Factors such as gaseous or particulate air pollutants may influence the properties of the wax and thus reduce or increase the rate of wax discharge. It could be possible that through shedding the wax layer the needle tips get so exposed that they are lost through drying out.

26768

APTIC NO. 48999

POWER FROM THE EARTH. *Natl. Eng.*, 77(1):10-12, Jan. 1973.

Pacific Gas and Electric Company's Geysers Power Plant in Sonoma County, Calif., is described. The power plant has a total of eight turbine generator units with a combined capacity of 290,000 kw, which use about 5,500,000 lbs of steam every hour. The steam leaving the well head at about 350 F is first cleaned of minute fragments of rock by centrifugal separators. The steam is piped into the power plant and then to a condenser which returns the steam to water by combining it with cooling water. The combined waters are then pumped to the cooling tower which operates without makeup water. The condensable gas content of the steam averages 1%, and it is composed of 79% carbon dioxide, 7% ammonia, 5% methane, 5% hydrogen sulfide, 1% hydrogen, and 3% inert gases, as well as a small amount of rock dust and traces of boron. The non-condensable gases from the condenser are purged by two-stage steam jet ejectors. A generating capacity of 500,000 kw is expected to be reached by 1975.

26769

APTIC NO. 49038

Greer, S. Thomas

INDUSTRIAL OVENS AND THE ENVIRONMENT. PART 1--THE ENERGY CRUNCH. *Ind. Finishing (Indianapolis)*, 1973:12-14, Feb. 1973.

The designer and operator of future industrial coating facilities faces the twin problems of energy conservation and hydrocarbon emission control (including odor). Thermal incineration with heat recovery requires maximum capital investment but can offer minimum fuel consumption and operating cost. The process permits compliance with Los Angeles County Rule 66, which requires that 85% of the hydrocarbons in bake oven exhaust gas be converted to carbon dioxide and water. Natural gas, oil, or liquefied petroleum can be used to supply energy for thermal incineration. The design of the incinerator burner and refractory wall will vary with each fuel.

26770

APTIC NO. 48950

Kempen, H. W. J.

NATURAL GAS AS A FUEL FOR AUTOMOTIVE VEHICLES. (Aardgas als brandstof voor motorvoertuigen). Text in Dutch. *Gas (The Hague)*, 93(1):8-13, Jan. 1973.

Experiments concerning the use of compressed or liquefied natural gas as a fuel for automotive vehicles are described. Natural gas-powered internal combustion engines require minimum amount of modification for the use of natural gas, and can be operated either on natural gas or on gasoline. The exhaust contains less than 0.1% carbon monoxide and no unburned residues under any operating condition. Diesel engines require major modifications which, along with certain operational disadvantages, require further study.

26771

APTIC NO. 48484

Lange, Karlheinz

STUDY OF THE COMBUSTION IN THE ENGINE BY OPTICAL METHODS. (Untersuchung der Verbrennung im Motor mit optischen Methoden). Text in German. *Motortech. Z. (Stuttgart)*, 34(1):12-17, 1973. 25 refs.

The combustion processes in an automobile engine were observed with a high-speed camera taking 8000 pictures/sec. The radiation intensity was measured with a photocell preceded by light filters. The visible range of the radiation was divided into 10 equally broad ranges of about 50 nm. For the tests a single-cylinder engine with divided combustion was used. The operation of the engine with a homogeneous mixture yielded a blue flame (maximum at lambda of 400 nm). This radiation develops by the carbon monoxide combustion. With diesel direct injection into the combustion chamber, the black body radiation in the red color range prevails. With injection of the fuel so that air distribution is largely achieved, the radiation has very high intensity and the entire combustion chamber is rapidly filled by the flame. With wall distribution of the fuel, a long lasting combustion is achieved in the vicinity of the wall with low radiation intensity. The radiation intensity provides no indication of the occurring waste gas turbidity. The highest turbidity was observed with wall distribution of the fuel, i.e., at lowest radiation intensity.

26772

APTIC NO. 48962

Lorsch, H. G.

THE USE OF SOLAR ENERGY FOR RESIDENTIAL SPACE HEATING. *Energy convers.*, 13(1):1-5, Jan. 1973. 17 refs.

A proposed solar heating system for a three-bedroom house incorporates a flat plate solar collector, preferably facing due south; thermal energy storage fitted into existing utility space and using latent or sensible heat; and two heat transfer loops employing liquid or gaseous heat transfer media. In most areas of the U. S., solar energy cannot be used economically as the sole source for space heating. A stand-by heating system with the same capacity as a conventional heating system is required. Fuel savings with a solar heat stand-by system could range from 11.5% for a 280 sq ft solar collector to 47% for a 560 sq ft collector with thermal storage of 150,000 Btu. Capital and operating costs for a 560 sq ft collector with storage are projected for 1975 and 1980.

26773

26773

APTIC NO. 48968

MacKillop, Andrew

LOW ENERGY BUILDING--WHY AND HOW? Bldg. Technol. Manage., 11(1):8-9, 11-13, Jan. 1973.

Measures to reduce energy consumption by buildings are discussed. They include the use of low-energy building materials such as soil-cement blocks or blocks from reclaimed glass and clay waste; improved thermal insulation standards; the use of equipment for absorbance and retention of solar energy; and methane gas production from sewage. Policies and techniques for the use of waste resources should be stimulated on a regional basis and should be complemented by the systematic use of ambient renewable energy sources, including the products derived from the activities of beneficial microorganisms.

26774

APTIC NO. 48667

Nakamura, Yoshio

AUTOMOBILE EXHAUST POLLUTION AND THE CVCC ENGINE. (*Jidosha haiki osen no haiki to CVCC enjin*). Text in Japanese. Kogai Boshi Sangyo (Environ. Pollution Control), 3(1):29-37, Jan. 1973.

The CVCC engine, developed by the Honda Motor Co., is a stratified charge engine which burns this and mixed gases generally impossible to burn in ordinary combustion. The emission of nitrogen oxides can be prevented, and full oxidation can take place so that hydrocarbons and carbon monoxide can be minimized. The only differences between the CVCC and conventional engines is the auxiliary combustion chamber which is equipped with a small sucking valve. In the auxiliary chamber, a comparatively thick mixed gas is formed, and in the bigger combustion chamber, a thin mixed gas is formed. Combustion starts in the auxiliary chamber and then goes to the entrance of the main combustion chamber, where the concentration is about medium. Then it goes to the main combustion chamber. Combustion is gradual, the maximum temperature is lower which decreases formation of NOx, oxidation takes longer which reduces HC, and there is sufficient oxygen in the thin mixed gas to reduce CO emissions. However, the engine capacity decreases and more gasoline is consumed.

26775

APTIC NO. 49007

Royal, M. J. and N. M. Nimmo

BIG METHANOL PLANTS OFFER CHEAPER LNG ALTERNATIVES. *Oil Gas J.*, 71(6):52-55, Feb. 5, 1973. 4 refs.

Jumbo methanol plants with single-steam capacity of 5000 tons/day offer a viable and attractive alternative to liquefied natural gas (LNG) schemes. Since the presence of carbon dioxide is beneficial to methane production, the CO₂ removal stage mandatory for pretreatment of LNG feedstock is eliminated. Moreover, nitrogen stripping is not necessary; two large methanol units under construction in Europe will use gas feedstock containing more than 14% N₂. Transoceanic shipment of methanol is in conventional tankers, which cost about \$35 million/vessel as against the \$90 million quoted in the U. S. for LNG tankers. The pollutant-free fuel is readily available for direct combustion or conversion to pipeline gas. Bulk storage is possible at low cost in conventional carbon-steel tanks. Over 80% of the expansion is methanol production is based on a copper-aluminum-zinc catalyst synthesis process operating at 750-1500 psig. Unlike plants based on intermediate to high pressure and on zinc-chrome catalysts, the low-pressure plants operate at or above flow-sheet rates. The trend in reforming-furnace design is toward top-fired modular units with double rows of tubes. This design ensures the highest thermal efficiency.

AIR POLLUTION ABSTRACTS, MAY 1973

1972

APTIC NO. 48523

26776

WANKEL, ENGINE OF THE FUTURE? *Natl. Eng.*, 76(10):8-10, Oct. 1972.

The Wankel engine, Stirling engine, and a gas turbine-powered car are discussed as alternatives to the standard internal combustion engine. The designs and operation of the three engines are described. Like piston engines, the Wankel discharges carbon monoxide, hydrocarbons, and nitrogen oxides; the Stirling engine has a potential for low emission and noise levels, and also shows promise for fuel economy over current engines at comparable performance levels; test of the gas turbine engine indicate low levels of unburned hydrocarbons, carbon monoxide, and nitrogen oxides. The research done to date on the engines is described.

26777

APTIC NO. 48528

THE QUEEN S WORRIES. *Czech. Motor Rev.*, 18(7):15-18, 1972.

The reduction of lead additives in gasoline should proceed in stages so that problems arising from the use of low-lead or lead-free gasoline can be solved gradually without adding to the cost of automobiles. These problems include engine knocking, valve seat recession, and the service life of catalysts for purifying engine exhaust gases. If designers would reduce compression ratios, there might be less demand for lead additives. Should this demand persist, engines could be designed with a bigger piston stroke than cylinder bore. This change would improve the combustion process and reduce harmful pollutants in exhaust gases. Improved induction systems would also contribute to cleaner exhaust gases.

26778

APTIC NO. 48647

PLASTIC WASTE AND ITS REMOVAL. (*Kunststoffmuell und seine Beseitigung*). Text in German. *Kunstst. Berat.*, 17(12):1044-1046, Dec. 1972.

The annual refuse quantity in the Federal Republic of Germany amounts to 250 million tons, of which 1% consist of plastic waste. The annual domestic refuse quantity is between 9 and 18 million tons, of which about 3% is plastic waste. Besides disposal in sanitary landfills, refuse removal by incineration also takes place. Incineration produces flue gases containing hydrochloric acid and sulfur dioxide. The annual emission of SO₂ amounts to 12,000 tons in the Federal Republic of Germany, that of HCl is 8000 t/yr. The total emitted SO₂ quantities in Western Germany amount to 4 million tons annually. The formation of HCl in the flue gases of incineration plants is partly caused by burning polyvinyl chloride. However, investigations in refuse incineration plants showed that even in case of an increase of 100% of the polyvinyl chloride quantity, there would be no emission damages caused by incineration plants.

26779

APTIC NO. 48658

A TWO-CYCLE ENGINE THAT IN SOME WAYS IS MORE LIKE A FOUR-CYCLE. *Prod. Eng.*, 43(12):11-13, Dec. 1972.

A design for a two-cycle engine was developed that combines some advantages of a four-cycle engine and promises a high horsepower-to-weight ratio. The engine has at heart a power piston with a rigidly attached pumping piston. The engine design and operation, advantages, and applications are reviewed. The advantages of the engine in comparison with other small engines are especially pronounced with respect to exhaust emissions, particularly nitrogen oxides. Emission levels of carbon monoxide and hydrocarbons are lower than those of the Wankel engine; NOx emissions are at the same medium range.

26780

APTIC NO. 48730

INVESTIGATIONS ON THE REGISTRATION OF INSTALLATIONS EMITTING SOOT AND DUST, BASED ON THE AIR POLLUTION CONTROL LAW. (Taiki osen boshiho ni motozuku baien hassei shisetsu, funjin hassei shisetsu todokedejokyo shirabe). Text in Japanese. Kankochō Kōgaisenmon Shiryo (Public Nuisance Gaz.), 7(4):50-61, July 1972.

Results of an investigation based on the reports to city and Prefecture administrators showed that, up to Oct. 1, 1971, there were 85,487 facilities in 45,606 factories that emitted soot and 13,998 facilities in 2531 factories that emitted dust. The 49,717 facilities, or 58.2% of the total facilities that emitted soot were reported after the new air pollution control law was issued on June 24, 1971. There were 55,405 boilers which occupied 64.4% of the total soot-emitting installations. In the 47 cities and Prefectures including Tokyo had the largest number of soot-emitting installations and Hyogo Prefecture had the largest number of dust-emitting installations. Numbers of furnaces and boilers in each city and Prefecture are listed.

26781

APTIC NO. 48809

SEQUENTIAL GASIFICATION PROCESS PROMISES LOW-COST SNG. *Oil Gas J.*, 70(16):116-117, Oct. 16, 1972.

A sequential gasification process (Segas) has been proposed as the base reaction for production of synthetic natural gas (SNG) from fuel oil. The Segas process is noncatalytic; it operates independently of pressure within extremely wide limits. Total estimated installed capital cost for 60 MMcf/d of synthetic natural gas is \$9,999,884. Total operating cost is \$0.05234/Mcf. The process is operated at a steam-to-carbon ratio of 2.5:1. The feedstock is cracked and reformed at 1800 F. Equilibrium output gases consist of steam, carbon dioxide, carbon monoxide, hydrogen, and hydrogen sulfide. The stream is processed in a hot dolomite sulfur-removal stage that removes 99% of the sulfur. The removed sulfur is converted by the Claus process into recoverable elemental sulfur. Approximately 25% of the stream is extracted for combustion gas which can yield about 23 hp power for in-process blowers and pumps. A methanation step is used to enhance the volumetric heating value of the main gas stream. The product gas has a heating value of 950 Btu/cu ft. With operation at 855 F, 500 psia, and 1.8 moles water removed, 97.9% of the available CO is extracted. The gas is further cooled and dried through a chemical drier. Delivered gas contains 0.011% water vapor, 6.25% hydrogen, 1.96% CO₂, 0.58% CO, 91.20% methane, and 0.02% H₂S.

26782

APTIC NO. 48831

REMOTE HEAT SUPPLY FOR THE CITY OF ZURICH. (Fernwaermeversorgung fuer die Stadt Zuerich). Text in German. Schweiz. Bauztg., 90(49):1267-1274, Dec. 7, 1972.

In the center of Zurich two smaller remote heating networks exist which are independent from each other. One is supplied by an incinerator, the other by the remote heat and power plant of the Zurich Technical University. Several years ago a masterplan for a third network was worked out which shall be supplied with heat from a second incinerator of the city. The surplus heat from the incinerator will go to a 7 Gcal/hr boiler. The major heat supply will come from three hot water boilers with a total capacity of 37.5 Gcal/hr. The boilers can be optionally fired with gaseous or liquid fuel. Each of the three boilers shall be equipped with multicyclone dust collectors. The cleaned waste gases will be discharged via a joint stack of 55 m height.

26783

APTIC NO. 48895

THE LNG CARRIER: A PRODUCT OF THE GROWING ENERGY CRISIS. *Marine Eng./Log.*, 72(10):38-39, 126, 128, Sept. 1972.

A sizeable fleet of liquefied natural gas (LNG) tankers must be constructed to meet the energy crisis in the U. S. By 1985, demand for gas in the U. S. will probably exceed the domestic natural supply by 4-5 trillion cu ft/yr. Imports of LNG will increase from the present negligible amount to almost 11 billion cu ft/h of natural gas equivalent daily; thus, some 120 LNG tankers of 125,000 cu m size will be needed. The cost of building a 125,000 cu m ship outside the U. S. would be \$64-67.9 million, or \$80-90 million if built in the U. S. A list is given of LNG ships now in service and those on order.

26784

APTIC NO. 48907

SMALL GAS TURBINES MAKE SENSE--BUT WILL THEY SUCCEED? *Engineer* (London), 235(6068):44-45, 47-49, 98, Sept. 21, 1972.

The present and future status of regenerative automotive gas turbines is reviewed. At the current state of the art, the automotive gas turbine meets the 1975-1976 U. S. emission standards for hydrocarbons and carbon monoxide; is close to achieving the standard for nitrogen oxides; satisfies anticipated noise level legislation; and has the capacity to run on a broad range of hydrocarbon fuels without major adjustment. Advances in manufacturing techniques suggest prices competitive with piston engine equivalents. However considerable work remains to be done in the area of cycle temperatures and new techniques are needed for large-scale production of components that account for 40% of total turbine cost. These are turbine rotors and nozzles, heat exchanger discs, seals, drive mechanism, and control systems for fuel and variable nozzles. Automotive gas turbines from 300-520 bhp with clean exhaust characteristics are in small-scale production now. Smaller 125-175 hp engines will be available from 1977 on for larger passenger cars. Sales will be in the U. S. and Japan, followed by general adoption in the 1980s.

26785

APTIC NO. 48910

OIL SHALE--A STATESIDE ANSWER TO PETROLEUM SHORTAGE. *Mining Engineering*, 24(10):95-98, Oct. 1972.

The conversion of oil shale to crude oil by the Tosco II retorting process was successfully demonstrated at an experimental mine and plant in the Piceance basin of Colorado. This basin contains 80 billion bbl of shale oil recoverable by modern methods in reserves containing at least 30 gal of oil/ton. In the Tosco process, preheated crushed shale is mixed with heated ceramic balls in a rotating drum. The hot balls heat the shale to 900 F where the solid kerogen is converted to hydrocarbon vapor. The oil vapors are drawn off, condensed, and treated in conventional oil processing units. The processed shale and ceramic balls are separated and the balls are recirculated through the ball heater. The crude oil produced by the process can be processed into gasoline, diesel, and jet fuel. Alternately, the crude can be upgraded to produce sulfur-free fuel oil, or a high quality feedstock for synthetic natural gas production. The first commercial facility using the process would probably produce 40,000-85,000 bbl/day of low-sulfur oil.

26786

APTIC NO. 48929

MODERNIZATION AND EXTENSIONS AT HAM-WORTHY. *Foundry Trade J.* (London), 133(2910):305-306, 308, 311-312, 315-321, Sept. 14, 1972.

Stage one of a major expansion program at a British iron foundry included the installation of a fully automatic Disamatic molding machine, capable of producing up to 300 high-precision molds/hr, plus an associated automatic sand-supply system, twin Birlec induction melting furnaces, and an electric holding furnace. The Disamatic unit produces highly compacted green-sand moulds in a vertical plane without boxes. The whole operation is carried out in a continuous straight line over a length of 120 ft, during which the moulds are made, cored, poured, cooled, knocked-out, and delivered into tote bins. The shake-out sand is passed through magnetic fields for the extraction of tramp metal and returned to the Disamatic sand hopper. The electric melting equipment, which is located

26787

next to the Disamatic line, has widened the foundry's capability to use spheroidal-graphite iron while minimizing air pollution. The foundry is now supplying low-phosphorus grey-iron castings for automobile hydraulic and mining equipment.

26787

APTIC NO. 48955

LOTUS ENGINE. *J. Automotive Eng.*, 3(4):29-30, April 1972.

The design and operation criteria of a Lotus engine are reviewed. In its standard form, the engine complies fully with 1974 emission requirements. Fast and complete combustion is effected due to a compact chamber form and a central sparking plug, thus controlling the carbon monoxide and unburned hydrocarbon content of the exhaust. Nitrogen oxide emissions are also maintained at a low level. The compression ratio is 8.4:1, but so modest is the octane requirement that the engine will accept 91 octane unleaded gasoline even at 9.7:1.

26788

APTIC NO. 48937

Akhtyrchenko, A. M.

IMPROVING THE QUALITY OF PRODUCTION - AS ONE OF THE MAIN FACTORS IN THE PROFITABLENESS OF THE COKE PROCESSING INDUSTRY. (Povysheniye kachestva produktsii - odin iz vazhnykh faktorov rosta rentabelnosti koksohimicheskogo proizvodstva). Text in Russian. *Koks i Khim.*, no. 11:46-51, 1972. 1 ref.

Recent quality requirements on coke production and possibilities of their satisfaction in the USSR are surveyed. Homogeneity and both reduced reactivity and sulfur content of the cokes are increasingly required, which will be correspondingly reflected by a new GOST standard that will be issued to supersede GOST 513-63. Increasing the coking temperature from 950-1000 C to 1050-1100 C with coking time unchanged constitutes one of the possible means of meeting the above requirement.

26789

APTIC NO. 48594

Bagge, L. P. and R. H. Shipman

PAPER 3. RESEARCH, DEVELOPMENTS, AND FIELD APPLICATIONS OF HIGH INTENSITY LPG COMBUSTION SYSTEMS. *J. Inst. Fuel*, 45(377):391-396, July 1972. 5 refs.

Research into the utilization and application of liquid petroleum gas (LPG) in industry, particularly the use of butane, is discussed. The LPG is suitable for all traditional gas-fired processes. Because it is virtually sulfur-free and has clean combustion characteristics, it is economically competitive with other fuels. Application techniques, burner design, and systems aimed at exploiting the inherent premium properties of LPG are being developed. Four examples of successful developments which exploit the premium properties of LPG in various applications are described: melting steel in an electric induction furnace using and oxy/propane mixture; supplementary butane firing of a rockwood cupola; the conversion to butane firing of a blue-brick kiln; and conversion to butane firing of a vertical shaft-type lime kiln using liquid butane combustion.

26790

APTIC NO. 48604

Boettger, W.

THE RAILWAY AND ENVIRONMENTAL PROTECTION. *Rail Int.*, no. 7/8:425-429, July/Aug. 1972. 1 ref.

The continued development of the railways to protect the environment against the side effects of noise and air pollution by exhaust fumes from the growth of traffic is discussed. Motor vehicle traffic routes, traffic volume, and the construction of new roads and highways are reviewed. The advantages of rail passenger and freight transportation are presented. The intensity of the engine and running noise of a diesel locomotive are compared to that of heavy road vehicles. The volume and

AIR POLLUTION ABSTRACTS, MAY 1973

composition of exhaust fumes, especially the amounts of carbon monoxide and hydrocarbons, from diesel locomotive and automobile engines are compared. Trains are also compared to buses and trucks.

26791

APTIC NO. 48951

Bruer, G. G., A. K. Ivanchikov, V. S. Kudrayavtsev, and A. M. Nikolayev

APPLICATION OF AN EXPERIMENTAL PILOT PLANT FOR HIGH SPEED PYROLYSIS OF LIGNITE BY MEANS OF GASEOUS AND SOLID HEAT CARRIERS. (Osvoyeniye opytno-promyshlennoy ustanovki vysokoskorostnogo piroliza burykh ugley s primeneniym gazovogo i tverdogo teplotonositeley). Text in Russian. *Koks i Khim.*, no. 11:22-28, 1972. 3 refs.

A pilot plant designed for the high-speed pyrolysis of lignite by means of gaseous and solid heat carriers is described. The lignite to be pyrolyzed is dried, crushed, and heated to 300-400 C. Pyrolysis takes place at an average temperature of 590 C in the presence of flue gases from the lignite heating operation and of coke dust. Semicoke and pyrolysis gas with a calorific value of 4760 kcal/cu m are obtained. The pyrolysis gas is composed of 25.6% of hydrocarbons, 21.7% of carbon monoxide, and 21.8% of hydrogen. Lignite dust particles present in the flue gas are separated by means of cyclones before recycling or discharge into the atmosphere.

26792

APTIC NO. 48732

Caban, Reinaldo and Thomas W. Chapman

LOSSES OF MERCURY FROM CHLORINE PLANTS: A REVIEW OF A POLLUTION PROBLEM. *Am. Inst. Chem. Engrs. J.*, 18(5):892-903, Sept. 1972. 54 refs.

Mercury is emitted into the air and water by many industries, including the chlorine industry. Chlorine-soda plants using the mercury-cathode process account for 1/3 of the U. S. mercury demand. Sixty-nine percent of the mercury used in this process is lost and returned to the environment. The most likely routes for mercury loss are the hydrogen gas stream, end box fumes, cell room ventilation air, sodium hydroxide, wash water from cell rooms, brine, solid wastes, and chlorine. Although sampling and analysis of the effluent streams present formidable problems, a number of sensitive analytical techniques have been developed. These include neutron activation analysis, spectrophotometry, mass spectrometry, electrochemical analysis, and gas chromatography. Flameless atomic absorption spectrophotometry is the most suitable method. The very dilute solutions which are analyzed tend to lose mercury by evaporation. Gaseous streams are generally analyzed by passing the gas through a strong oxidizing solution and subsequently analyzing this solution by flameless atomic absorption. An acidic permanganate solution is usually used as the absorption solution. Because of the difficulties in sampling and analysis, no complete experimental mercury balance has been established which accounts for all the mercury loss, although several tentative estimates have been made. Several mercury recovery processes from gaseous streams, liquid streams, and solids are discussed. Recovery processes should be integrated into a recycling system in order to meet economic and environmental considerations. Some relevant aspects of mercury chemistry are presented in an appendix.

26793

APTIC NO. 48518

Currie, W. J.

DEEP COAL MINING AND THE ENVIRONMENT. *Colliery Guardian (London)*, 1972:56-64, Oct. 1972.

Protection of the environment by prevention control or the elimination of any new pollution and the removal of old scars in the deep coal mining industry is discussed. Pollution of the air by grit, dust, and smoke from boiler furnaces is reviewed. Maintaining boiler plant furnaces in operation within the limits set for smoke emission requires correctly operated mechanical

stokers with provision for primary and secondary air control and avoidance of peak loads. Grit emission can be overcome by attention to draught control, fire thickness when fine fuels are burned, and by frequent use of flue cleaning equipment where fitted. Measures taken to reduce the dispersal of air-borne dust created during the handling of the coal in preparation, blending, stocking or in loading out to dispatch transport include: wetting down the run-of-mine coal during production; enclosure of the processes with dust extraction and collection hooding; and the use of water sprays at crusher discharge points -- with the use of additives to improve the wetting effect of water on fine dusts. The problems of noise, water pollution, landscape disfigurement, solid waste disposal, land reclamation, and the increase in production costs are also reviewed.

26794

APTIC NO. 49002

Depew, C. A., M. J. Mann, and R. C. Corlett

TECHNICAL NOTE: A LABORATORY SIMULATION OF WOOD PYROLYSIS UNDER FIELD CONDITIONS. *Combust. Sci. Technol.*, 6(4):241-246, Dec. 1972. 8 refs.

A laboratory simulation of wood pyrolysis under field burning conditions is discussed. An experimental apparatus was developed, and in a preliminary way exploited, to independently investigate the effect of local environmental variables on the pyrolysis of fuel elements typical of logging slash. The apparatus is capable of imposing ranges of incident radiant flux and ambient air flow rate for a cylindrical wood specimen. Outputs are the specimen weight loss rate and particulate air pollutant production rate. The fuel used was Douglas fir doweling, both plain and treated, with a flame retardant, principally diammonium phosphate. The combustion patterns tended to become independent of fuel conditions and retardant treatment at relatively high environmental temperatures. At lower temperatures, combustion patterns were difficult to reproduce, and were very sensitive to flame retardant treatment. No evidence was found that flame retardant treatment under otherwise controlled conditions resulted in the reduction of air pollutants.

26795

APTIC NO. 48700

Douaud, A.

SIMULATION OF INTERNAL PHENOMENA IN THE CYLINDER OF A COMPRESSION IGNITION ENGINE.

(Simulation des phenomenes internes au cylindre d'un moteur a allumage par compression). Text in French. *Entropie*, no. 45, p. 17-30, May/June 1972. 14 refs.

A mathematical model describing the cyclical progression of phenomena occurring inside the cylinder of a compression ignition engine was developed by computer. Basic model characteristics include: homogeneous-phase combustion with dissociation effects, instantaneous gas-wall heat transfer, wall temperatures averaged for a cycle, and mass transfer under quasi-static conditions. The energy, mass, and exchanged-heat balances were computed. An example of the application of the model to compute instantaneous wall temperature was given. Analysis showed that, in the absence of deposits, cyclical variations in wall temperatures were slight. (Author abstract modified)

26796

APTIC NO. 48461

Drew, R. D.

PARTICULATE EMISSIONS FROM THERMOFOR CATALYTIC CRACKING (TCC) UNITS. *Proc. Am. Petrol. Inst. Div. Refining*, vol. 52:532-534, 1972. (Presented at the American Petroleum Inst., Div. of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

Particulate emission rates from a thermoform catalytic cracking (TCC) unit are examined. Typically, a 20,000 barrels/day TCC unit emits 30-70 lbs/hr of total particulates. Emission control is accomplished mainly by catalyst attrition control. Factors im-

portant in minimizing catalyst attrition including design, maintenance, operation, and the catalyst itself are reviewed.

26797

APTIC NO. 48686

Eberan-Eberhorst, Robert, Dusan Gruden, and Gerd Schwarzbauer

THE EXHAUST EMISSION OF THE OTTO ENGINE IN KNOCKING COMBUSTION. (*Die Abgasemission des Ottomotors bei klopfender Verbrennung*). Text in German. *Erdoel Kohle (Hamburg)*, 25(12):715-718, Dec. 1972. 4 refs.

Engine knock can be produced by varying the air/fuel ratio, the compression ratio, or ignition advance; these factors also affect exhaust emissions. Knock intensity 0-100 was measured with a standard knockmeter in the ASTM-CFR test engine, and pollutant emission variations caused by knock and various operating variables were measured. The combustion temperature and nitrogen oxide emissions increased with the knock. The hydrocarbon emission were lower with knock than normal, provided the air/fuel ratio or ignition changes have caused knock; HC emissions were higher due to changes in the compression ratio. The hydrocyanic acid, formaldehyde, and ozone emissions increased rapidly with knock intensity, producing a stronger exhaust smell.

26798

APTIC NO. 48785

Effenberger, E.

AIR POLLUTION. (*Luftverschmutzung*). Text in German. *Oeffentl. Gesundheitswesen (Stuttgart)*, 34(2):61-67, 1972. 9 refs. (Presented at the Gesundheitspolitischen Tagung des Sozialministeriums des Landes Schleswig-Holstein, 8th, Oct. 16-17, 1971.)

The extent of air pollution in the Federal Republic of Germany is discussed. In the Hamburg area, systematic measurements of the atmospheric dust concentrations were taken as early as 1952. Schleswig-Holstein is the least air polluted state. Although the number of industries increased sixfold over the last 20 years, they are concentrated in several industrial centers, and the rest of the country remains free of pollution sources. Traffic is as dense as elsewhere in the FRG, but the state has a high diffusion coefficient due to frequent winds in this part of the country. Predictions on future air pollution concentrations are difficult to make with great accuracy, but certain trends are predictable. The weight quantity of dust per unit of air will drop to about 50% of the present value by 1980. The fraction of fine dust below 5 micron will rise, however. The sulfur dioxide concentration of the air will also decrease until 1980, despite increasing power demand. From the extensive measurements of the emissions in North Rhine Westphalia, it was calculated that between Oct. 1961 and Sept. 1970 about 1.9 million tons of dust fell on the Ruhr area spanning a total of 1850 sq km. The legal basis for taking extensive emission measurements are the Technical Directives for the Maintenance of Clean Air. Further air monitoring tasks will be assigned by the new emission protection law which presently exists in its draft version.

26799

APTIC NO. 48515

Elkin, H. F. and R. A. Constable

SOURCE/CONTROL OF AIR EMISSIONS. *Hydrocarbon Process.*, 51(10):113-116, Oct. 1972. 20 refs. (Presented at the American Inst. of Chemical Engineers, Air Technical Forum, Dallas, Tex., Feb. 1972.)

Specific emissions from oil refineries include sulfur oxides, hydrocarbons, nitrogen oxides, particulates, aldehydes, ammonia, odors, and carbon monoxide. The principle sources of these emissions and control measures practiced are reviewed. To limit SO₂ emissions, a refinery must remove hydrogen sulfide from fuel gas streams, maximize use of natural gas as a fuel, blend heavier high-sulfur internal fuels with desulfurized distillates, and maintain a high-efficiency sulfur recovery plant. Control of nitrogen oxides emissions requires com-

bustion modification. Cyclones and electrostatic precipitators are used to collect particulates from catalyst regenerator exit gases. Aldehydes and ammonia from catalyst regenerators can be controlled by incineration in a waste heat boiler. Increased use of hydrogen treating is simplifying the nuisance problem of malodorous compounds. Only moving-bed catalyst regenerators and fluid cokers emit significant amounts of CO. Use of waste heat boilers to burn CO to CO₂ adequately controls CO emissions from these units.

26800

APTIC NO. 48945

Feron, J.

DEVELOPMENT AND FUTURE PROSPECTIVES IN ELECTRIC POWER PRODUCTION IN FRANCE.

(*Evolution et perspectives d'avenir de la production d'énergie électrique en France*). Text in French. Ind. Miner., 54(11):499-508, Nov. 1972.

The postwar development and future prospects in electric power production in France, and related environmental problems and pollution control possibilities are surveyed. With energy production having steady, regular growth, the proportions of coal and hydroelectric power plants have been and will be steadily decreasing, while that of nuclear and especially of fuel oil-fueled power plants will show a marked upward trend. The use of large power generating units constitutes a prerequisite for efficient and economical pollution control in power generating. Opacimetrically controlled electrostatic dust precipitators with efficiencies ranging from 95 to 99% are used for dust emission control in coal-fueled power plants, while pollution monitoring is done by dust settling measurements over 15-day periods and by sulfur dioxide monitors. Fuel oil-powered plants, emitting SO₂ and unburned solid particles, possess pollution control methods such as the use of high stacks, combustion control, and neutralization of acid components in flue gases by additives. Low-sulfur fuel oil should be used under adverse meteorological conditions when none of the above measures is sufficient. Sulfur dioxide monitoring at 5-10 min intervals around such power plants should be applied. Nuclear power plants require the use of filters with an efficiency of 99 to nearly 100% for the separation of dust and aerosols from any kind of gas including ventilation air.

26801

APTIC NO. 48909

Franzen, L. F.

DESIGN AND PRODUCT IMPROVEMENT FOR NUCLEAR POWER PLANTS WITH VIEW TO ENVIRONMENT PROTECTION. (Planung und Produktverbesserung fuer Kernkraftanlagen im Hinblick auf den Umweltschutz). Kerntechnik, 14(10):466-471, 1972. 21 refs.

At German nuclear power plants with pressurized water reactors, all systems in which gaseous radioactive materials accumulate are connected to an off-gas system. The gases are carried together with nitrogen cover to a recombiner, to assure reaction of the radiolytically generated hydrogen with oxygen, and then led to decay tanks from which they are released after a delay of 20-30 days. In new installations, the decay tanks have been replaced by activated charcoal beds which assure an average delay time of 60 days for xenon and 2.5 days for krypton. Gases accumulating in the turbine condensers of nuclear plants with boiler water reactors are continuously withdrawn and led to a recombiner for catalytic reaction of hydrogen with oxygen. The gas is then passed through a delay pipe which assures a delay time of 42 min, sand filters for retention of radionuclides in aerosol form, and, in case of increased occurrence of fission noble gases and iodine, a further delay system consisting of activated charcoal beds. The delay times of krypton and xenon are 1 day and 14 days, respectively. Before reaching the vent stack, the off-gas is again passed through aerosol filters. Radioactive releases to the environment from German nuclear plants are less than 30 mrem/a. Though a further reduction is not urgent, a number of possibilities are under consideration including solvent extraction,

condensation in liquefied nitrogen followed by fractionation, and separation by semipermeable membranes. In the future, thermal pollution by nuclear plants may be avoided by use of dry cooling towers.

26802

APTIC NO. 48783

Fukuie, Noriko, Takayoshi Sugimoto, Hitoshi Yamasaki, and Ekiko Jo

PARTICULATES IN VEHICLE EXHAUSTS. (*Jidosha haiki-chu no biryushi ni tsuite*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 308. (Nov. 7-9, Paper 255.)

The composition of catalyst particles emitted in automotive exhaust and their sizes and shapes were examined. The engine used was a water-cooled four-cycle engine with 1988 cu cm capacity with the maximum power output of 115 ps/5800 rpm. The exhaust gas was taken into a cascade impactor at 17.5 l/min and collected on a sheet mesh for an electron microscope. The samplings were taken from the exhaust of a normally operated engine, and both leaded and non-leaded fuels were used. The particle size and shape distributions were examined by electron microscopic photographs. The composition of the pellet catalyst was 10.74% copper, 2.96% chromium, 12% iron, and 74.3% aluminum. The samplings from the cascade impactor's fourth step were used. The exhaust gas was sealed in a chamber for 16 hours to examine the settling of the suspended particulates. The compositions of the suspended particulates were varied in compositions, sizes, and shapes. The relationship between the size and composition was not clear. The mean size was 0.1 micron, and the shapes were extremely varied and irregular. Under the same engine conditions, 98% of particles from the leaded fuel were less than 0.1 micron, and only 9% of particles from the non-leaded fuel were less than 0.1 micron. Most of larger particles were composed of iron and carbon. Leaded fuel particles are believed to settle quicker than those from the non-leaded fuels. In this experiment, when using leaded fuel, less than 0.4 micron particles stayed suspended for a long time.

26803

APTIC NO. 48810

Fusamura, Nobuo and Makoto Mori

DUST EMISSION FACTORS IN ROCK CRUSHING PLANTS. (*Saiseki puranto ni okeru funjin haishutsu keisu*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 153. (Nov. 7-9, Paper 108.)

The dust emission indexes at various processing operations at rock crushing plants were examined. The production capacity of four plants ranged from 140 to 425 t/hr. Samples were collected by high-volume air samplers with filter paper for 25 min each. The dispersion rate of dusts in the leeway of the emission sources and the wind velocity in that location were measured, and the emission quantity was calculated from the concentration at the same location. At least three measurements were taken before arriving at the average. The dust emission quantity/hp/hr at each emission source was calculated. The range of the emission index could be determined according to the type of the emission source. When the rocks were dry and the facilities were open, the index was larger. The dampness of the material especially affected the dust amount when the rocks were dumped from the truck into the first crusher. The difference of the rock types had no effect on the amount of the dusts. When using the same type of rocks and the same type equipment, the greater the horsepower, the less dust per horsepower was noted. The ripple flow screen created a considerably high rate of dust for its relatively small horsepower. The dust quantity of the product ranged between 2800-120 g/ton. The Joe Crusher, Impact Crusher, and Low-head Screen were sources of large dust indexes.

EMISSION SOURCES

26809

26804

APTIC NO. 48720

Gilchrist, Ralph Edward

FOSSIL FUELS AS THE NON-POLLUTING FUELS OF THE FUTURE. Preprint, 12p., 1972. 10 refs. (Presented at the International Pollution Engineering Congress, Cleveland, Ohio, Dec. 4-6, 1972, Paper 26a.)

The U. S. may run out of cheap energy, but fossil fuels are still very much a part of our future. In the next 5-25 years, much will be accomplished through more efficient recovery of known fuel reserves. Five recovery processes ready for large-scale commercial application have the potential for recovering 60-90% of oil from a reservoir. The reshuffle of end-use and the application of technology to meet changing environmental demands will affect fossil fuel utilization. No practical technology exists for desulfurizing coal, but more than 50 flue gas desulfurization systems are now available. Most are capable of 90% or better sulfur dioxide removal efficiency. Another aspect of end-use reshuffle is the application of alternate fuels such as ammonia, hydrazine, alcohol, hydrogen, and hydrocarbon fuels with additives to internal combustion engines. Actual and potential uses for coal and lignite ashes and sulfur residues are reviewed.

26805

APTIC NO. 48536

Goto, Takao

AIR POLLUTION NEAR AN IRONWORKS. (Seitetsusho shuhen no taiki osen ni tesuite). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 8(11):1097-1108, Nov. 1972. 19 refs.

Between 1961 and 1971, steel production in Japan increased by four. Occupational diseases and accidents decreased; incidence of lung cancer, bronchitis, skin diseases, and other respiratory diseases increased among residents within 1 km of steel mills. The overall emission of dust, aerosols, and gases from steel mills has not been effectively studied, although a few studies have been made. Results of one study of a steel mill are presented. Diffusion formulae for stack gas were developed. Dust composition and concentrations, sulfur dioxide and trioxide diffusion, and effects of high stacks were studied. Steel mill pollution was found to be more important than pollution from other industries.

26806

APTIC NO. 48591

Gregory, S. A.

TRANSPORTATION. Chem. Engr. (London), no. 266:376-386, Oct. 1972. 26 refs.

Trends in bulk transport, particularly as it concerns international trade, and personal transport, particularly within national boundaries, are reviewed. Subsidiary functions needed to attain transportation and transportation system selection influences and criteria are listed. Bulk shipment of materials is projected to increase in the next decade. Whether the production plant will shift toward marine terminal sites will depend on size of market, cost to point of scale, and return on effective overall investment. The motor car will remain the backbone of personal transport within those economies where there is a sufficient level of wealth. Cars should not be built to last longer if they are to incorporate improvements able to reduce air pollution and improve city traffic. For this purpose and to meet the increasing demand for recovery of metals, it will be important to construct cars on an easy recycle basis. This will tend to emphasize the value of steel and depress the value of man-made polymers. Natural materials such as wood and rubber will be permissible provided that demands do not outrun supplies. Transition to an easy recycle economy will be more likely in mature economies with small reliance on imported cars.

26807

APTIC NO. 48547

Hammond, Allen L.

SOLAR ENERGY: THE LARGEST RESOURCE. Science, 174(4054):1088-1090, Sept. 22, 1972. 2 refs.

The development and possible applications of solar energy for heat, electricity, and chemical fuels is discussed. To date solar energy is used in a limited way in water heaters, furnaces, and space applications. With the continued development of solar technology the first significant use of solar energy would be heating and cooling homes and low-rise commercial buildings. For space heating the solar collector, a black metal surface covered with glass, absorbs radiation waves to create a greenhouse effect. The heat is collected in water or air which is circulated through the collector. Experimental cooling units are being developed for air-conditioning, and complete household energy prototype systems that utilize heat pumps for space conditioning are being investigated. The generation of electricity with heat from solar energy is also being researched. The use of power and vapor turbines that use heat from solar collectors are being considered. The apparatus needed and the cost and difficulties of operating a central solar-thermal plant are reviewed. Potential environmental problems stemming from thermal pollution and radiation hazards; the need for the further development of solar technology; and the necessity of changing social attitudes toward the use of solar energy, especially in changing building codes, are discussed.

26808

APTIC NO. 48849

Hettche, Hans Otto

AIR POLLUTION AND HEALTH - A PROGRAM OF 1960. (Luftreinhaltung und Gesundheit - ein Programm von 1960). Text in German. Staedtehygiene (Uelzen/Hamburg), 23(12):273-275, 1972.

The European Committee for Diagnostics of Health Damages (Eurotox) and for the Protection of the Population met in Paris in 1960 to investigate the air pollution problem. A resolution was passed calling for the improvement of domestic heating systems by promotion of central heating, for the reduction of toxic components in automobile exhausts, for the separation of industrial and residential areas by green belts, and for reducing the railroad emissions by turning to electric and diesel drives. Twelve years after this conference, it can be said that much has been done since 1960 for the reduction of air pollution. In the Ruhr area, the sulfur dioxide and dust emissions have been continuously monitored since 1964. The dust emission was reduced considerably, and the SO₂ emission also went down markedly due to better electrostatic precipitators and the use of low-sulfur fuels. Gas and electricity are increasingly used for heat production. Oil central heating systems are being annually inspected in North Rhine Westphalia. The emission of hydrogen fluoride has received great attention; aluminum plants are now required to clean their waste gases satisfactorily. For decontamination of automobile exhausts, the lead concentration in gasolines is being reduced. The afterburning of carbon monoxide and hydrocarbons will become indispensable soon. Much has been done for electrification of the railroads.

26809

APTIC NO. 48584

Howard, Geoffrey P.

A CAR FOR 1976. Autocar, 137(3988):4-7, Sept. 1972.

A proposed 1976 car is a three-rotor Wankel with each chamber size a nominal 500 cc. This gives the engine a capacity equivalent to 3 l for very low engine weight and extremely compact dimensions. The automatic gearbox is behind the final drive unit, with the torque converter in front. Suspension is by double wishbones and torsion bars at the front, semi-trailing arms and coil springs in the rear. To meet emission standards on engine exhaust gases, half of the exhaust is passed through a conventional silencer and the remainder through a two-stage reactor. A catalyst bed in the front half of the reactor breaks down nitrogen oxides into nitrogen and oxygen. Secondary air injected into exhaust gases as they move over a second catalyst bed oxidizes carbon monoxide to carbon dioxide and converts unburned hydrocarbons to water vapor and carbon dioxide. This system depends on suitable catalysts being developed by 1976.

26810

APTIC NO. 48954

Jones, L. G.

DESIGNING A NEW PLANT WITH POLLUTION CONTROL AS A MAJOR PROGRAM OBJECTIVE -- THE GARDNER-DENVER CASTING CENTER AT PRYOR, OKLA. Preprint, 4p., Dec. 1972. (Presented at the International Pollution Engineering Congress, Cleveland, Ohio, Dec. 4-6, 1972, Paper 9.)

Production problems to be solved in order to reduce pollutants at a new foundry are discussed. The casting industry needs sand for its molding operation. The sand cost of \$1250/day, plus the costs of handling, transportation, and disposal are a major impetus to reduce sand consumption. Major pollutant problems of smoke, dust, and noise on the four green-sand molding lines are reviewed. The no-bake method of core production involves dust control in the delivery of new and reclaimed sand. Very fine dust particles must also be collected from the cleaning operations. A minimum-pollutant painting system was considered for the last step in the casting process.

26811

APTIC NO. 48921

Karim, G. A. and M. E. Taylor

HYDROGEN-OXYGEN FUEL SYSTEM RAISES ENGINE THERMAL EFFICIENCY. *Automotive Eng.*, 80(11):24-26, Nov. 1972. 14 refs. (Presented at the Society of Automotive Engineers, International Automotive Engineering Congress, Detroit, Mich., Jan. 8-12, 1973.)

A hydrogen-oxygen fueled spark ignition engine with exhaust gas recycling was tested in computer studies to determine optimum operating variables. The predicted effect of compression ratio and various diluents on ignition delay, peak temperature and peak pressure versus fuel supply rate, and predicted engine performance, cylinder pressure, and thermal efficiency are presented. A thermal efficiency of 35% could be achieved. The only exhaust would be water removed from the system at the condenser.

26812

APTIC NO. 48733

Kirov, N. Y. and D. Iverach

FORMATION AND CONTROL OF NITROGEN OXIDES IN COMBUSTION PROCESSES. *Australian Chem. Process. Eng. (Sydney)*, 25(7):13-18, July 1972. 20 refs. (Presented at the International Clean Air Conference, Melbourne, Australia.)

The formation and control of nitrogen oxides in combustion processes are discussed. The increasing emission of NO_x into the atmosphere as a result of the continual growth in motor transport and heat and power generation, the resulting chemical reaction of NO_x with other organic compounds and hydrocarbon vapors, and the formation of photochemical smog are reviewed. Average emission factors for coal-, oil-, and natural gas-fired boilers and power plants are listed. Concentrations of NO_x in combustion gases from coal-burning processes were higher than those produced from burning other fuels, the concentrations decreasing in the order of coal, oil, and gas. Experiments were carried out on a pilot plant scale of a coal-fired combustor unit. The formation of nitric oxide in combustion gases and their concentration were calculated by the Zeldovich model and compared with the experimental results. The oxygen concentration and the maximum temperature attained in the process have a dominant effect on NO formation in the post-flame gases. Methods considered for controlling and reducing the formation and emission of NO_x included combustion at near-stoichiometric conditions or two-stage combustion to reduce oxygen concentration; and humidification of the combustion air, flue-gas recirculation, steam or water injection, and fluidized-bed combustion to reduce furnace temperatures. The development of the fluidized-bed boiler for use in industry and for power generation is reviewed.

26813

APTIC NO. 48508

Kobayashi, Hiroshi, Eiji Ebisawa, Toshio Tsujimoto, and Katsuhisa Taguchi

STUDIES ON CYANIDES IN AUTOMOTIVE EXHAUST GAS. (*Jidosha haigasū-chū no shian ni tsuite*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 315. (Nov. 7-9, Paper 262.)

It has been reported that a considerable amount of cyanides are emitted in automotive exhaust gases. Using an impinger-type sampler with a battery, exhaust gases from various types of microbuses and trucks at various modes of operation were examined. The gases were passed through 20 ml of 2% caustic soda (sodium hydroxide) at 0.14 l/min for several minutes. The acetic acid-copper-acetic acid benzene method, the picric acid method, the electrode method, and the pyridine-pyrazolone method were used for detection and measurements of cyanides. All methods confirmed the existence of cyanides in the exhaust gases. In all but one case, the measurements were high at the time of acceleration and low at the time of idling. One type of light truck showed high emission of cyanides while idling, and an extremely low figure while driving. The causes are not clear.

26814

APTIC NO. 48801

Kraus, Willibald

HIGHLY CHARGED STEAM GENERATOR WITH NATURAL CONVECTION. (*Hochaufgeladener Dampferzeuger mit Naturumlauf*). Text in German. *Brennstoff-Wärme-Kraft*, 24(12):439-444, Dec. 1972. 16 refs.

The combination of heat and power generation has the advantage of requiring less fuel and of producing less waste gases which have to be discharged into the atmosphere. Also, the amount of waste heat going into rivers or the ambient air is lower. In the field of power generation, the combined steam and gas turbine process gains increasing importance because of its higher efficiency and reuse of waste heat. The constructive design of a boiler with a maximum long-term capacity of 80 t/hr, an overpressure of 85 bar, a hot steam temperature of 525 C, a feed water temperature of 245 C, a combustion chamber pressure of 7 bar, and a waste gas temperature of 810 C is shown in a graph. In the gas turbine succeeding the boiler, the flue gases expand and leave the turbine with an overpressure of about 0.02 bar and a temperature of 470 C. In a feed water preheater, the waste heat of the flue gases is reduced from 470 to 170 C which raises the feed water temperature from 130 to 245 C. Natural gas is used as the main fuel with a lower heating value of 35.2 MJ/cu m; light fuel oil is used as second fuel if the natural gas supply fails. The upright cylindrical steam generator with concentric cage heating surfaces is a water tube boiler with natural convection. Varying carbon dioxide concentrations in the waste gases must be controlled. As long as extensive operating experiences are lacking, an air surplus of 1.20 to 1.25 shall be maintained at the boiler end.

26815

APTIC NO. 48493

Krenkel, A. Ralph and Reuben B. Goldblatt

STOL AIRCRAFT FOR URBAN TRANSPORT IN THE LONG ISLAND-NEW YORK CITY AREA. *J. Environ. Syst.*, 2(2):141-163, June 1972. 15 refs.

The prime objective of urban mass transit is the reduction of noise and air pollution. However, previously studied mass transit systems have required ground corridors to link trip origins and destinations; these restrict system speed, are disruptive to the community, and tend to concentrate the environmental impact of the system. The feasibility of a commuter transport system utilizing Short Take-off and Landing (STOL) aircraft operating in the Long Island-New York City area was studied. The STOL system, the Long Island Railroad, and automotive travel were compared on the basis of

EMISSION SOURCES

26821

door-to-door trip times and costs. The STOL system was technically feasible, in that an airplane was designed so that its characteristics were consistent with commuter operations. However, the system was not economically feasible without substantial subsidies from outside sources. The plane was relatively pollutant-free, compared with the internal combustion engine. However, no significant improvement in urban air pollution could be expected through the use of STOL aircraft as a substitute for the automobile, because most auto trips originate less than .3 miles from the city, and the STOL cannot operate efficiently below this distance. (Author abstract modified)

26816

APTIC NO. 48912

Kumar, K. S. and R. P. Lottman

USING STRAW TO REINFORCE RIGID URETHANE FOAM. *Agr. Eng.*, 53(10):45-46, Oct. 1972.

Air pollution regulations in the inland Northwest prohibit the burning of plant stalks and tillers, but the use of grain tillers for semi-structural applications appears feasible. Laboratory tests with straw reinforced urethane foam demonstrated that straw improved the fracture toughness of the foam and increased its strength and bending stiffness. Potential uses for straw reinforced rigid foams are semi-structural panels and storage tanks.

26817

APTIC NO. 48943

Kuntscher, Volkmar

REDUCING THE EMISSION OF HYDROCARBONS OF TWO-STROKE OTTO ENGINES. (A ketutemu Otto-motorok szénhidrogén kibocsátásának csökkentése). *Text in Hungarian. Jarmuvek, Mezogazd. Gepek*, 19(10):392-396, 1972. 13 refs.

Exhaust emission components as affected by load conditions of a three-cylinder, two-stroke Otto engine, and the effects of fuel injection on the amount of hydrocarbon emissions were investigated. The carbon monoxide concentration in the exhaust gas was around 1% by volume, with maxima reached under full load conditions. Also the nitrogen oxide concentrations increased with load. Direct fuel injection and stratified charge have a reducing effect on the hydrocarbon emissions, since even very lean mixtures can be applied, and the air is used for flushing. The fuel distribution among the cylinder is more uniform compared to the conventional fuel supply.

26818

APTIC NO. 48808

Lloyd, P.

THE AEROPLANE AS A THREAT TO THE ENVIRONMENT. *Aeronaut J.*, 76(742):599-606, Oct. 1972. 16 refs.

Pollution of the lower atmosphere by airplanes is negligible even though the smoke plume emitted by some aircraft during takeoff can create a local nuisance. New fuel injection techniques are reducing carbon formation in combustion chambers. Engine-generated noise is a more widespread problem and harder to treat than chemical pollution. Up to the present the reduction of aircraft noise has come from the power plant and this process will continue, though probably with diminishing results. With supersonic airplanes, the task of noise reduction is essentially one of designing mixing devices to break up the high speed core of the jet without excessive thrust penalty. There are possibilities for noise reduction in the airframe field. The use of fan engines in conjunction with jet flap or other high-lift devices could shorten takeoff and increase angle of climb, reducing the size of the noise footprint under the takeoff path. The introduction of a two-segment approach could eliminate the noise nuisance under the distant approach path. The effect of regulations governing flyover, approach, and lateral noise will not be felt until the aircraft of the 1960s are no longer in service. No measures are available for reducing sonic boom. Recent estimates indicate that supersonic transport will not increase stratospheric water vapor enough to

produce noticeable climatic changes. Another possibility is that oxides of nitrogen from turbojet exhausts will accumulate in the stratosphere and destroy the ozone layer by photochemical reactions.

26819

APTIC NO. 48603

Maple, Ralph E. and A. Roy Price

WASTE CHEMICALS HAVE VALUE...SOMETIMES.

Hydrocarbon Process., 51(10):168-172, Oct. 1972.

The recovery of by-product waste chemicals in the petrochemical industry is discussed. Important factors involved in recycling, including the volume and value of recoverable chemicals, the costs of collection and transportation, constant supply, efficiency of the recovery process, and recovery plant pollution abatement, are listed. A chemical recovery complex, processing waste caustic from the petroleum industry, and recovering salable cresylic acids and sodium sulfide, is described. The processes used to recover cresylic acids and sodium sulfide from spent caustics are described. The recovery plant pollution control methods are discussed. These include a water re-use system to produce zero effluent, the use of chemical scrubbers, incineration, and chemical odor neutralizers for odor control. No smoke or other particulate emissions are generated by the recycling process. Product end uses for the recovered chemicals are listed.

26820

APTIC NO. 48669

Marks, V. E.

COKE OVEN EFFLUENTS. *Effluent Water Treat. J. (London)*, 12(8): 415-419, Aug. 1972. 41 refs.

Atmospheric and liquid pollutants emitted during coking processes and the operating methods of the coke industry are reviewed. The atmospheric pollutants include smokes, tar vapors, dusts, sulfur dioxide, odors, hydrogen sulfide, cyanides, and pitch fumes. Atmospheric pollution can be controlled to a large extent by careful operation and maintenance. Smokeless charging equipment to control smokes and cooling tower gases are also available. Liquid effluent treatment methods and costs are reviewed.

26821

APTIC NO. 48807

Matheson, Graeme

THE EXPERIMENT NOBODY WANTS. *Water Pollution Control (Toronto)*, 110(9):60-61, 63, 65-66, Sept. 1972. 13 refs.

Asbestos is a carcinogen and co-carcinogen. People who smoke and who also work with certain levels of asbestos are 92 times as likely to contract lung cancer as the general populace. The practice of fireproofing of steel frame buildings by spraying asbestos-based insulation on the beams is a dangerous source of asbestos fibers ranging from 5-100 micron in length and 250 Å in diameter. Air conditioning systems with filters used to remove the fibers are not effective enough to remove the tiny particles. The only type of filter known to trap the sub-micron particles is the high efficiency particulate filter. Millipore membrane filters were used to take samples of air near the processing plant of a large asbestos products manufacturer in Ontario and collected particles were counted under an electron microscope. Currently, many authorities accept two fibers/cu cm as the allowable occupational exposure. But what is counted as two fibers when the fibers can break down into smaller particles? Some authorities feel two fibers/cu cm is not stringent enough for ambient exposure, and that the figure should be 0.04 fibers/cu cm instead. Measurements of the air inside British offices revealed concentrations exceeding the Ontario standard of 0.4 fibers/cu cm. During air erosion tests of sprayed asbestos material, less than one particle/sq cm was emitted at 265 ft/min for half an hour (about the rate expected 5 ft from the opening of a typical intake. The death rate for asbestos workers is much higher than that normally expected. Autopsies on urban residents showed that

48.3% had some asbestos fibers. In Canada, all studies have concentrated on occupationally exposed groups. Due to the potential hazard of asbestos fibers, the asbestos content of sprayed asbestos-mineral material has been lowered from 60 to 10%.

26822

APTIC NO. 48575

Maugh, Thomas H., II

HYDROGEN: SYNTHETIC FUEL OF THE FUTURE.

Science, 178(4063):849-852, Nov. 24, 1972.

It is likely that electricity will play a larger role in supplying future energy demands and that heat energy from nuclear reactors will be utilized in larger nuclear/industrial complexes. Nonetheless, there will remain a strong demand for portable, fluid fuels, particularly for applications in transportation, and the most likely response to this demand will be increased production of hydrogen. The efficiency of hydrogen-fueled engines is as much as 50% greater than that of gasoline engines. Nitrogen oxides are the only pollutants emitted by hydrogen-fueled engines, and the amounts produced are much lower than in conventional engines. A promising hydrogen storage technique is storage in the form of metal hydrides, which are formed by exposing the metal (e.g., titanium) to pressurized hydrogen. Hydride formation is exothermic and can be reversed by waste heat from the combustion process. Cryogenic storage would be adequate for subsonic or supersonic aircraft, and may be necessary for hypersonic aircraft. An equally important use of hydrogen would be energy transmission over long distances. Since hydrogen is readily stored, the electric industry could operate near 100% capacity at all times, with the stored hydrogen used to meet peak demands for power. Commercial electrolyzers for the production of hydrogen from water have high operating efficiency, but overall efficiency of hydrogen production is limited by the efficiency of electricity generation (35-45%). Alternative processes under consideration are direct thermal decomposition of water in a reactor, direct production of hydrogen from water by algae, and use of ultraviolet radiation from the plasma of a fusion reactor for direct photolysis of water vapor. The costs of hydrogen could be balanced by credits from the sale of by-product oxygen. Hydrogen and oxygen would find wide use in coal gasification, while inexpensive oxygen could be used in crude oil desulfurization, shale oil production, and the manufacture of synthetic fuels.

26823

APTIC NO. 48463

Nobles, Elon J. and Martin J. Van Sickels

SNG -- NEW EFFICIENCY COMPLEMENT FOR REFINERS. *Proc. Am. Petrol. Inst. Div. Refining*, vol. 52:283-299, 1972. (Presented at the American Petroleum Inst., Div. of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

The applications of substitute natural gas within the context of clean fuel demands and fuel shortage conditions are examined. The basic process for substitute natural gas production and adaptability are reviewed. Three basic processes are in commercial use: the catalytic rich gas process, the Lurgi process, and the Japan gasoline process. The major qualities required of a good process are efficiency, reliability, and cleanliness. An adapted process is described which embodies hydrodesulfurization with sulfur recovery, catalytic rich gas gasification, methanation, and carbon dioxide removal and gas drying. The major process steps, economics, and operating variables are defined.

26824

APTIC NO. 48855

Odaira, Toshio, Kimio Kubota, Yasuo Iida, Koichi Inoue, and Kunio Yoshizumi

FUEL EFFECTS ON AUTOMOTIVE EMISSIONS. (*Nenryo sosei to jidosha haiki gasu seibun ni suite*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 310. (Nov. 7-9, Paper 257.)

AIR POLLUTION ABSTRACTS, MAY 1973

As a preliminary step for analyzing the relationship between the fuel composition and the automotive exhaust gas composition, a test car driven on a dynamometer and the exhaust gas was measured by the non-dispersive infrared standard method. Idling, 10, 20, 40, and 80 km/hr speed tests and four mode tests were given.

26825

APTIC NO. 48964

Painter, D.

A LANCASHIRE BOILER CHANGE OVER. *Inst. Gas. Eng. J. (London)*, 12(10):305-309, Oct. 1972. (Presented at the Manchester District Junior Gas Association, Warrington, England, Feb. 9, 1972.)

The procedures, installation, economics, and advantages of changing over from a fossil fuel to natural gas at a boilerhouse are reviewed with respect to boiler design, operation, and testing. The changeover achieved an efficiency almost equal to oil (75%) and a 20% increase in steaming rate.

26826

APTIC NO. 49001

Pavanello, Renato

SOMETHING IN THE AIR. *World Health*, 1972:22-23, 1972.

Air pollution caused by odors and odoriferous substances is discussed. Odors can be sporadic, emanating from a known source or point, and can be easily distinguished, or they may be diffuse. Examples of pervading smells from domestic heating, steel mills, canals, sewage aeration, and vehicle exhausts in Europe and the United States are given. The main industries causing odor problems are kraft mills, oil refineries, mineral wool plants, and several types of food processing installations. The effects of odors on health are reviewed. Research is needed to study long-term effects of persistent odors on the physical and mental health of communities; on the physiology of the sense of smell; and on the psychological aspect of odor perception and the individual reaction to it. Efforts to control odors from pulp mills and oil refineries are considered.

26827

APTIC NO. 48928

Penny, Noel

THE POTENTIAL FOR A TURBINE CAR. *Gas Turbine Int.*, 13(5):14-16, 18-19, Sept./Oct. 1972.

Improvements to existing piston engines are discussed together with the current status of steam engines, Stirling engines, Wankel engines, electrically powered vehicles, and gas turbines. The different power systems are compared with respect to thermal and energy conversion efficiencies, emission characteristics, fuel consumption, noise level, weight, and cost. The gas turbine has an immense development potential and is the most likely successor to the piston engine from 1975 on. The simple automotive regenerative gas turbine satisfies the 1975/1976 U. S. Federal Standard for hydrocarbons and carbon monoxide and is close to meeting the standard for nitrogen oxides. Other advantages of the gas turbine are low noise levels, multifuel capability, fuel consumption comparable with that of the most efficient diesel, low weight, maximum torque at zero output speed, and ability to benefit from much higher cycle temperatures. Advances in manufacturing techniques suggest that automotive and truck gas turbines can be produced at prices competitive with piston engine equivalents. By 1980, gas turbines may power 50% of heavy truck production in the U. S. and 20% of off-highway applications.

26828

APTIC NO. 48608

Pond, James B.

SUNDSTRAND S ORC ENGINE GOES FOR A BUS RIDE. *Automotive Ind.*, 147(10):37-40, Nov. 15, 1972.

An organic Rankine cycle engine was used to demonstrate the feasibility of powering city buses by an external combustion engine. The complete system consists of a burner, vaporizer,

EMISSION SOURCES

26835

turbine, regenerator, and condenser. The design, operating variables, and performance of the engine are reviewed. Emissions were well below the 1976 standards for nitrogen oxides, hydrocarbons, and carbon monoxide.

26829

APTIC NO. 48819

Renner, Roy A.

EXTERNAL COMBUSTION ENGINES: PROSPECTS FOR VEHICULAR APPLICATION. *Highway Res. Rec.*, no. 397, p. 55-62, 1972. 13 refs.

External combustion engines (ECE) are discussed as possible alternatives to the internal combustion engine for vehicle propulsion. The California Steam Bus Project is described, in which the following were evaluated: road performance, exhaust emissions, sound levels, fuel consumption, safety, size and weight of the external combustion engine, operational characteristics, and economics of the system. Potential advantages of the ECE are low levels of exhaust pollution, quiet operation, high starting torque, and possible lower costs during a vehicle lifetime. Project studies indicated that competitive road performance is obtainable with steam-powered city buses, but fuel consumption is higher than with a diesel engine. Opportunities remain open for the evolutionary improvement of thermal efficiency. Logical early applications of the ECE include stop-and-go fleet vehicles. Types of ECE include steam engines (Rankine cycle), Stirling engines, and gas turbines (Brayton cycle).

26830

APTIC NO. 48741

Shapritskiy, V. N.

CONTROLLING ATMOSPHERIC CARCINOGENICS.

(Zashchita atmosfery ot zagryazneniya natserogennymi veshchestvami). Text in Russian. *Stal*, no. 10:961-963, 1972. 12 refs.

Figures concerning the inorganic and organic carcinogenic emissions are reviewed with special regard to coking and metallurgical operations. Carcinogenic zinc and beryllium salts, as well as nickel, chromium, and arsenic compounds are present in the air in fairly small concentrations around nonferrous metallurgical plants. Thermal engineering processes are accompanied by the formation, above 400-500 C and especially around 800 C, of carcinogenic 3,4-benzopyrene and 1,12-benzoperylene. These compounds undergo complete combustion at temperatures exceeding 1000-1100 C. The quantity of these carcinogens is dependent on the combustion conditions and on the combustion chamber design. Coal dust-firing chamber furnaces emit no carcinogens, and neither do natural gas-firing furnaces under optimal conditions. Cupola coking furnaces firing solid fuel emit substantial amounts of organic carcinogens (2.2-379 g/t), and so do cokeries due to the relatively low temperature (190-630 mg/cu m of waste gas). Throat gases from steel-smelting cupola and open-hearth furnaces contain very small amounts of carcinogens due to the high temperatures occurring in such furnaces. Spark ignition and diesel engine exhausts contain 0.01-0.2 and up to 0.01 mg/cu m of carcinogens. Emission control methods currently available permit substantial reduction of carcinogenic emissions from metallurgical plants.

26831

APTIC NO. 48936

Sklyar, M. G.

PROSPECTIVES IN THE DEVELOPMENT OF THE LAYER COKING PROCESS. (Perspektivy razvitiya protsessy sloyevoogo koksovaniya). Text in Russian. *Koks i Khim.*, no. 12:19-24, 1972. 37 refs.

Problems and possibilities of the development of the layer coking process and of dry quenching are outlined. Investigations have proved the feasibility of the coke dry quenching process, and its superiority over wet quenching. Improved coke quality and reduced pollutant emission are the basic advantages of the dry quenching process.

26832

APTIC NO. 48498

Scott, David

FIRST DETAILS OF ANGLO-AMERICAN ANIDYNE ENGINE REVEAL A ROTARY-CYLINDER DESIGN. *Automotive Ind.*, 147(10):22-23, Nov. 15, 1972.

An Anidyne engine was developed in the rotary-cylinder design with conventional pistons that avoid difficult sealing and manufacturing problems. The engine has a favorable surface/volume ratio, is capable of high compressions, and is inherently balanced so that it needs no counterweights. The design and operation are reviewed. Afterburning using charge air will be used to reduce exhaust emissions.

26833

APTIC NO. 48942

Sokolov, V. Z., Yu. V. Frolovnin, O. F. Sukhova, and V. D. Barskiy

IMPROVING THE RAW BENZENE PROCESSING PROCEDURE BY MEANS OF A SULFURIC ACID PURIFICATION PROCESS. (Sovershenstvovaniye protsessy pererabotki syrogo benzola s primeneniym sernokislotoy ochistki). Text in Russian. *Koks i Khim.*, no. 12:24-28, 1972. 18 refs.

Four different schemes for the purification of raw benzene by means of sulfuric acid were tested on a laboratory and pilot scale, and problems of losses involved in the sulfuric acid purification process were studied. The total loss amounts to 6.5-12%, of which 2-2.5% escapes into the atmosphere. Losses due to emission are dependent on the cooling system, the number of the rectification and distillation operations, and on storage tank ventilation, rather than on the purification method. The head fraction from raw benzene, unavoidable technologically, is used for the recovery of carbon disulfide and cyclopentadiene.

26834

APTIC NO. 48548

Trickett, D. B.

PRINCIPLES OF OPERATION OF MERCURY CELLS.

S. Afr. Chem. Proc. (Capetown), 1972:21, 23, 25, Sept. 1972.

Four major functional areas of sodium chloride electrolysis in mercury cell plants are reviewed: brine purification, DC power supply, electrolysis, and collection and processing of products. Trace metal removal from brine feed solutions is of paramount importance to safe mercury cell operation, especially since small increments in trace metal concentrations produce drastic changes in hydrogen evolution. Purified brine solution is fed to the electrolyzer where electrical current is passed through, liberating chlorine gas at the anodes. The gas is disengaged and drawn off to the treatment plant. Sodium metal is deposited at the surface of the mercury cathode in which it dissolves to form a liquid amalgam. This amalgam then flows into a denuder cell where it is decomposed by demineralized water, giving a 46-50% solution of sodium hydroxide with evolution of hydrogen gas. Small quantities of mercury are carried out of the cells in solution in chlorinated brine suspended as minute droplets in caustic soda and as vapor or mist in the gas streams. Measures to control mercury pollution include filtration of caustic soda; treatment of waste waters by sulfide precipitation; conversion of direct contact hydrogen cooling systems to shell and tube heat exchangers; cooling of hydrogen streams to 3 C followed by filtration through carbon jemister pads; and retorting of mercury-rich sludges.

26835

APTIC NO. 48535

Tsunemi, Masaaki

ANTI-KNOCKING CHARACTERISTICS OF NON-LEADED GASOLINE. (Muen gasorin no anchi nokku sei). Text in Japanese. *Jidosha Gijutsu (Automobile Eng.)*, 26(9):1092-1099, Sept. 1972. 15 refs.

In April 1974, Japanese regulations will eliminate all lead additives in automobile gasoline, resulting in more friction,

decreased anti-knock characteristics, and changed exhausts. Cars normally using high octane gasoline will have considerable knocking difficulty, and it will be necessary to adjust the ignition. Present cars may require a special type of gas. The transition between leaded and unleaded fuels should take place gradually. No-lead fuels will require more octanes, such as 6.3 octane for ordinary gasoline and 4.6 octane for special gasoline. Hydrocarbons in the exhausts will probably not change because of reduced lead. Most Japanese automobiles are manual shift cars with a maximum octane requirement at 1000-1500 rpm. Attempts are being made to produce lead-free gasoline with sufficient anti knock characteristics.

26836

APTIC NO. 48946

Ussar, Max Boris and Karl Bergmann

ENVIRONMENTAL PROBLEMS ON THE INDUSTRY. (*Die Umweltprobleme der Industrie*). Text in German. Berg-Huettenmaenn. Monatsh., 117(8):275-280, Aug. 1972. (Presented at the Oesterriche Bergbautag, Baden, Austria, April 25-28, 1972.)

General problems of industrial air pollution as encountered in industrialized countries are reviewed. The sulfur dioxide emissions show a downward trend in most industrialized countries, which is primarily attributable to the increasing use of low-sulfur fuels. Dry and wet processes for the separation and conversion of SO₂ in waste gases are expected to reach the stage of technological maturity before long. Nitrogen oxide emissions, determined by flame temperature and air excess, originate primarily in industrial and internal combustion engines processes. While industry generates practically no carbon monoxide due to near-complete combustion, automotive exhaust and domestic heating emit sizable proportions of this pollutant. A survey of the recent trends in the development of industrial and other emissions shows that coarse dust and SO₂ as pollutants will be replaced, along with the associated problems, by such industrial pollutants as fluorine, chlorine, hydrocarbons, toxic and malodorous gases, vapors, and aerosols.

26837

APTIC NO. 48737

Van Der Linden, Septimus

LIGHT WEIGHT INDUSTRIAL GAS TURBINES RELIABLE AND LOW COST POWER SOURCE FOR HEAVY DUTY SERVICE. SAE Australasia, 32(3):105-108, July/Aug. 1972. 3 refs. (Presented at the International Gas Turbine Conference, Melbourne, Australia, Sept. 7, 1972, Paper 11.)

The gas turbine is in a good position to meet power demands while complying with antipollution restrictions. Lightweight gas turbines have ratings of 50-60 mw/electric generator with heat rates below 12,000 Btu/kwh. Simple cycle units can burn distillate fuels as well as natural gas, require no water, and can achieve low nitrogen oxides emissions without the use of water or steam injection. Space requirements are minimal, and smokeless combustors and good sound attenuation allow plant locations near residential and urban areas. Demonstrated low maintenance costs, high availability (99.3%), and starting and load reliability make the lightweight gas turbine a major asset to utility generating capacity. Combined cycle units are used for mid-range power generation (150-400 mw). Heat rates are below 9000 Btu/kwh, and water requirements are 1/2 or 1/3 of those of steam plants. Anticipated developments in lightweight gas turbines are simple cycles with heat rates of 10,000 Btu/kwh and 1000 mw units with 1/3 capacity from a conventional steam plant made possible with transpiration air-cooled turbines. Such a cycle would provide heat rates of 6400 Btu/kwh and would be ideal for improved coal gasification systems. Packaged, modularized gas turbines and their support systems are described.

26838

APTIC NO. 48963

Vida, Miklos and Laszlo Molnar

COMPLEX HOUSING ESTATE HEAT SUPPLY PLANNING METHOD. (*Lakotelepi hőenergia-ellátás komplex halozatmeretezési módszere*). Text in Hungarian. Energiagazdalkodás, 13(12):550-552, Dec. 1972.

A method for the computerized optimization of the complex housing estate heat supply (for heating, hot water, and cooking) is described. Minimum annual costs of heat supply per apartment have been adopted as a criterion for the variation model. Coal is an obsolete and polluting form of energy. Electricity was also ruled out for the heat supply system, while other conditions such as comfort, and environmental and esthetic aspects were assessed subjectively or qualitatively. Computer programs for the optimization of radial gas distribution with minimum pressure loss at the system end points, of radial remote heating systems for the determination of pipeline diameters and delivery pressures, and of looped gas distribution network design with permanent pressure reserve were elaborated. The programs, requiring minimum machine time to be run, also allow for future expansion of housing development projects entailing increased heat demands.

26839

APTIC NO. 48800

Voigtsberger, Paul and Guenter Matzkuhn

STUDY OF THE POLLUTANT EMISSION BY AUTOMOBILE ENGINES. PART II. (*Untersuchung der Schadstoffemission von Kraftfahrzeugmotoren Teil 2.*) Text in German. Automobiltech. Z. (Stuttgart), 74(12):479-483, 1972.

An extensive study of the pollutant emissions by German-made passenger cars was continued, and the engine characteristics of three more automobiles were tested. With the first of the three cars tested, the emission of the various pollutants was initially rather low, which was due to the lean adjustment of the gasoline injection pump. Very soon, however, (after 5000 km) readjustment of the mechanical injection system became necessary through which the changing of the exhaust gas composition could not be improved. At partial load operation, the carbon monoxide and hydrocarbon emissions were relatively low, the oxides of nitrogen emission high. At full load operation the situation reversed. The second of the three vehicles was equipped with a new engine with Man Air-Ox system. The latter was removed after a while. A direct comparison between the engine performance with and without the Man-Air-Ox system was not possible because a bearing broke right after the removal of the Man-Air-Ox system. With the Man-Air-Ox system, an average CO concentration of 2.1% by volume was measured. After removal of the system, the CO concentration rose and the nitric oxide and nitrogen dioxide concentrations dropped. The last car tested was equipped with electronically controlled gasoline injection. The exhaust gas composition varied greatly. From initially favorable emission concentrations it changed at times to very unsatisfactory concentrations. But in general the exhaust gas characteristics were better with gasoline injection systems than with carburetor equipped engines.

26840

APTIC NO. 48467

Wigg, E. E.

FUEL EXHAUST COMPOSITIONAL RELATIONSHIPS IN CURRENT AND ADVANCED EMISSION CONTROL SYSTEMS. Proc. Am. Petrol. Inst. Div. Refining, vol. 52:964-988, 1972. 16 refs. (Presented at the American Petroleum Inst., Div. of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

The effect of fuel hydrocarbon composition on exhaust hydrocarbon and oxygenate emissions was determined for five vehicles equipped variously with a dual catalyst system, thermal reactors, and exhaust gas recirculation devices and fueled by unleaded fuels. Compared to current vehicles, the exhaust from the catalytic systems showed very low fuel effects, while

the thermal reactor system showed only somewhat lower fuel effects. The slopes of the relationships between fuel and exhaust aromatics for the 1970, 1971, catalyst, and thermal systems were 0.49, 0.45, 0.05, and 0.41, respectively. Hydrocarbon mass emissions were very low from both advanced systems, averaging 0.1 g/mi. Total exhaust gas photochemical reactivity from both systems was also very low. The exhaust gas recirculation system had no significant effect on hydrocarbon or oxygenate emissions. Aromatic aldehyde content was directly related and formaldehyde content was inversely related to fuel aromatic content in current vehicles. (Author abstract modified)

26841

APTIC NO. 48904

Wilson, Maurice J.

SOLID WASTE TO FUEL NASHVILLE PLANT. *Natl. Eng.* 76(10):11-13, Oct. 1972.

A plant using solid waste as fuel to provide community heating and cooling will begin operation in 1974 in Nashville, Tennessee. Initially, the plant will consume 720 tons of solid waste/daily in two incinerator boilers to produce 215,000 lbs of steam/hr. The steam will be used for heating and to drive two waterchilling machines with a total 13,500 tons. By 1978 the plant will be producing 500,000 lbs of steam/hr in four incinerator boilers, and 31,000 tons of cooling capacity in five large water chillers. The free energy recovered from solid waste will permit the plant to produce steam for 70% less cost than a fossil fuel plant and chilled water for about 60% less. The single plant, equipped with efficient emission control devices, will be responsible for lower pollution levels than those generated by existing individual plants. Auxiliary burners and over-air combustion will completely burn smoke particles so fly ash will be the only particulate matter leaving the combustion chamber. Dry cyclone collectors will then remove particles larger than 10 micron. The remaining particulates and gaseous pollutants will be treated in three-phase wet scrubbers.

26842

APTIC NO. 48581

Yoshino, Masao and Kiyoshi Sasaki

INVESTIGATION ON SULFUR OXIDE IN OITA-SAGANOSSEKI DISTRICT. (*Oita-Saganoseki chiku ni okeru io sankabutsu ni tsuite*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 186. (Nov. 7-9, Paper 141.)

The 1971 measurements of sulfur oxides in the Saga area of Oita-Prefecture by the lead dioxide method were analyzed. The increase of high concentration of SO_x began about 1969. However, the rate of increase was relatively small in comparison to the rate of the increase of the total emission of pollutants including sulfur oxides, due to the collectivization of high stacks. The pollution patterns are clearly divided into three blocks, and the seasonal fluctuation shows that the square area of pollution blocks increases in spring and winter when sea breezes are frequent.

26843

APTIC NO. 48779

Zockel, M.

THE CONSTANT-VOLUME GAS TURBINE--AN ALTERNATIVE TO THE SMALL GAS TURBINE? *SAE Australasia*, 32(3):98-104, July/Aug. 1972. 2 refs. (Presented at the International Gas Turbine Conference, Melbourne, Australia, Sept. 7, 1972, Paper 9.)

The basic cycle of a constant volume gas turbine is the Atkinson cycle. An adiabatic compression process is followed by constant volume combustion, with associated pressure rise, and an adiabatic expansion down to atmospheric pressure. Cycle calculations show that thermodynamic gains can be realized by operating a simple cyclic gas turbine on the constant volume principle; these advantages increase substantially when operating at part load. Combustion pulse rates of 30 Hz and

combustion pressure rise factors of 60% of the ideal pressure rise have been demonstrated with single-valved combustors and without any noticeable heat problems. However, these conditions have been achieved at fuel-air ratios higher than those theoretically necessary to achieve the required combustion pressure rise. More effective stratification techniques are being developed to make operation at lower fuel-air ratios possible. Turbine behavior with unsteady flows and pressure ratios is of vital importance to both thermal efficiency and part load performance. Only one single stage radial turbine has been examined theoretically, and this turbine was not specifically designed for unsteady flow or a range of pressure ratios. General considerations suggest that the constant volume engine is better than the constant pressure turbine in response rate under load changes and pollution levels, and is similar in specific weight, specific volume, noise, and reliability. The carbon monoxide and nitrogen oxides levels should be lower than constant pressure turbines. However, high hydrocarbon levels can occur. (Author conclusions modified)

CONTROL METHODS

1973

26844

APTIC NO. 48545

Harada, Tokuji

DEVELOPMENT OF THE TECHNOLOGY OF GASIFICATION DESULFURIZATION. (*Gasuka datsuryo gijutsu kaihatsu ni tsuite*). Text in Japanese. *Kogai Boshu Sangyo (Environ. Pollution Control)*, 3(1):58-63, Jan. 1973.

Gasification of heavy oils is divided into three types of processes: partial oxidization, thermal medium method, and hydrogenization cracking. A special subsidy system for developing closed process for elimination of polluting process was established by Ministry of International Trade and Industry in 1972, and the Ube system of gasification was awarded a subsidy. Residual oil under normal pressure and vacuum is partially burned into a conventional type furnace, and cracked into gas, light oil, heavy oil, and carbon. Heavy oil and carbon thus isolates are further isolated into carbon dioxide and hydrogen rich gas in a high temperature furnace for cracking (1100-1200 °C) together with the carbon adhered to particles from a cooler, which cools gas, as well as traps tar and pitch in the gas. Light oil can be made into a low sulfur fuel, after treating it by a desulfurization process adding hydrogen, or can be returned to the furnace for gasification. By this process, more oil per reactor capacity can be treated; unique inorganic particles are used; cracking conditions can be freely selected, and heavy oil can be cracked at high temperatures; by making tar and cokes adhere to the surface of particles, combustion is made easy for regeneration or for heat recovery; since tar and cokes can be completely trapped, there is no more trouble after the distillation tower process; most of sulfur in the gas is hydrogen sulfide, so that up to 0.01% it can be eliminated by an absorption method. Since the heat generated is high (7000-8000 Kcal/Nm³ cu m), existing boilers at generating stations can be used. Gas fuel without causing pollution can be obtained from high sulfur content heavy oil and asphalt. If gas fuel is supplied to all the factories in a combined area, individual desulfurization becomes unnecessary and its cost is equal to or lower than liquefied natural gas, liquefied petroleum gas, or low sulfur oils, whose supply is not stabilized.

26845

APTIC NO. 48856

Kuroda, Yutaka

NITROGEN OXIDES EMISSION FROM AUTOMOTIVE ENGINES. (*Jidosha kikan ni okeru NOx no seisei to haishutsu*). Text in Japanese. *Nippon Kikai Gakkai-shi*

(Journal of the Japanese Society of Mechanical Engineers) (Tokyo), 76(649):120.127, Jan. 1973. 16 refs.

The higher the maximum gas temperature of the combustion cycle, the greater the emission of nitrogen oxides by automotive engines. Greater oxygen concentrations and greater humidity also produce more NOx. The emitted NOx concentration is approximately equal to the equilibrium concentration calculated at the maximum temperature of the gas. More than 95% of the NOx emitted for internal combustion engines is nitric oxide which oxidizes to nitrogen dioxide after emission. A new approach to NOx emission control was studied by testing various model gases. When the gas had a greater specific heat, more inhibition of NOx formation occurred. The heat capacity of the gas in the cylinder affected the inhibitory action more than the volume of gas introduced. In order to reduce NOx by 90% as required in Japan and the U. S. in 1976, the following control methods are being studied: changes in engine parts, fuel composition, octane number, and operation; recirculation of exhaust gases; water or alcohol injection; and reducing agents or catalysts. The effects of lower NOx on engine capacity, fuel cost, emissions of hydrocarbons and carbon monoxide, engine dirt, and ammonia generation are discussed. Measurement methods are also mentioned.

26846

APTIC NO. 49024

Marshall, Robert W.

BOILER CONVERSION -- AN EFFECTIVE POLLUTION CONTROL. *Iron Steel Engr.*, 50(1):59-64, Jan. 1973.

Much of the major design criteria of a boiler is based on the type of fuel to be used (coal, oil, fuel gas) and the manner of combustion. When the fuel is changed, new equipment must be capable of releasing the required energy impingement on water wall surfaces. Available electronic fuel/air control systems permit single fuel on simultaneous multiple-fuel firing operations. Boiler load requirements determine the total firing demand, but the control system can increase, limit, or interrupt the flow rate of a preselected primary fuel and simultaneously make corresponding changes in the secondary fuel rate, maintaining a total fuel input that satisfies the master firing rate demand. Field-erected and packaged boilers are compared. Boiler conversions for optimum performance at various fuel selections are examined.

26847

APTIC NO. 48828

Reichelt, Wolfgang

GAS PURIFICATION EQUIPMENT HAVING MOVING PACKINGS. (*Fuellkoerperapparate mit bewegten Fuellkoerpern fuer die Gasreinigung*). Text in German. *Chem.-Ing.-Tech.*, 45(1):25-29, Jan. 1973. 23 refs.

Equipment having moving fluidized packings subjected to countercurrent flow of gas and liquid have been used for about a decade for exchange processes and wet dust extraction. Few systematic studies of process engineering problems involved have hitherto appeared in Western literature. The flow properties and the material exchange properties of such systems are described, drawing on the presently available literature. These units permit much higher gas and liquid throughputs than previous countercurrent equipment and are superior to other constructions (e.g., plate columns and packed columns) with regard to mass exchange efficiency. Floating bed contactors (fluidized bed contactors) have carrier grates on which the packing material rests prior to the start of the operation. During operation the packing material is in motion. The free cross section of the carrier grate influences the flow properties in the packed tower. The first versions had a free cross section of the grate of 90%. In the meantime, versions with a free cross section of the grate of about 30% have been constructed. In this case the flow condition in the fluidized bed is comparable to that in a bubble column with dispersion agents. Above the bed a sieve is installed which prevents the loss of packing material.

AIR POLLUTION ABSTRACTS, MAY 1973

26848

APTIC NO. 48811

Schackmann, H.

ENVIRONMENTAL PROTECTION IN METALLURGICAL PLANTS. (*Umweltschutz in Huettenbetrieben*). Text in German. *Metall (Berlin)*, 27(1): 41-47, Jan. 1973.

The non-ferrous metal industry has to cope with four environmental problems, the pollution of water and air, noise, and solid waste disposal. For the production of copper, tin, and lead, as well as other non-ferrous metals, sulfur-containing ores are used. The sulfides are roasted and the developing sulfur dioxide is usually so concentrated that it can be converted to sulfuric acid. All newer plants are equipped with Bayer double catalyst plants which operate with an efficiency of 99.5%. While the entire SO₂ emission in the Federal Republic of Germany amounts to between 3.5 and 4 million tons, the total emission of SO₂ from sulfuric acid production is only 25,000 tons, i.e., 0.6% of the total quantity. There is no metallurgical industry today in West Germany which is not re-using the SO₂. The dust emission causes greater problems in this industrial branch than does the SO₂ emission. Most of the dust cleaning problems can be solved, with the exception of the aerosols developing at the production of ferro-alloys. The most expensive problem is the removal of fluorine. Expensive cleaning plants had to be installed in new aluminum electrolysis plants whose costs amounted to 20 and 25% the total investment costs. All air pollution problems in industry can be solved, it is just a matter of costs.

26849

APTIC NO. 49010

Stevens, Charles H.

ECONOMICAL CONTROL OF AIR POLLUTION FROM TEXTILE DRYERS. *Mod. Text.*, 54(2):24-25, 35, Feb. 1973.

Methods for air pollution control and waste disposal from textile dryers are reviewed. A demister, preceded by cooling coils, was chosen for control of the odorous haze emitted by the heat setting operations. The pollutant laden air passes through lint filters to remove particulate matter and then comes in contact with the cooling coils which condense the pollutants out of the air stream. The design and operation of the process, removal efficiency, field experiences, and costs are reviewed.

1972

26850

APTIC NO. 48471

WOODROOM INCREASES FIBER YIELD. *Chem 26/Pap. Process.*, 8(11):44-47, Nov. 1972.

An environmental protection program at an Ontario pulp and paper mill included installation of a woodroom which combines barking and chipping for the kraft, newsprint, and sulfite pulp mills and development of a fluidized bed solid waste disposal system. Key elements in the woodroom are a deicing deck for frozen wood, dry barking, and slashing after barking. The facility provides higher fiber yields and higher Btu-value bark for fuel. Bark from the woodroom and clarified sludge from the kraft and newsprint mills are conveyed pneumatically to the fluid bed system, where they are incinerated at 1500 F. The reactor is a steel tank lined with insulating and refractory brick. A centrifugal blower supplies fluidizing air and combustion air to the fluidizing zone, which is preheated to 900 F. The fluidizing medium is pure silica sand. Particulates in reactor combustion gases are removed in a two-stage scrubbing system consisting of a wetted-throat venturi scrubber and a secondary scrubber with beds of glass spheres.

26851

APTIC NO. 48521

GENERAL MOTORS INSTALLS ADDITIONAL CASTING FACILITY. *Foundry Trade J. (London)*, 133(2917):563-566, Nov. 2, 1972.

CONTROL METHODS

A new iron foundry facility is described. The facility features highly mechanized and computer-controlled processes for making small and medium-sized castings. Process innovations in production and aesthetic environmental features are listed. The production system, including the use of remote control, flaskless moulding, the shakeout system, and the computer system are described. Circulating water in collectors is used to clean the plant air, which is then exhausted to the outside. Fumes generated in the preheating operation are collected and incinerated in afterburners. The entire ventilating system is monitored by a computerized control station. Noise abatement and lighting in the plant are reviewed.

26852

APTIC NO. 48568

ENVIRONMENTAL PROTECTION--A CONSOL OBJECTIVE SINCE 1948. *Coal Age*, 77(10):122-138, Oct. 1972.

Between 1966-1972 the Consolidation Coal Co. (Consol) spent a total of \$20.2 million on environmental control projects. These projects have included changes in coal preparation plant facilities, construction of advanced chemical plants for mine drainage treatment, surface mine reclamation projects, and demonstration projects concerned with reducing air and water pollution by acidic contaminants in refuse piles and mine drainage. Stack emissions at a West Virginia coal preparation plant are now below the 0.01 grains standard cu ft of dry gas specified by state law. The control system comprises a thermal dryer with 170 sq ft of drying-bed area, a dry dust collector made up of 42 multitube cyclones, and two high-pressure drop venturi scrubbers operated in parallel. The new dryer simplifies dust collection by providing better moisture control. Scrubber efficiency is better than 99%. Preliminary results obtained with vegetative covers and chemical stabilizers on refuse piles show a substantial reduction in air pollution and better than 90% reduction in water pollution. Waste-water treatment, land reclamation, and air pollution controls for coal cleaning and coal utilization processes are among the primary responsibilities of Consol's Environmental Quality Control Department.

26853

APTIC NO. 48580

DUST-FREE COATING OF BLACK-TOP MATERIALS.

Roads Road Constr., 50(596/597):253-254, Aug./Sept. 1972.

In a new stone coating process, cold aggregate is fed into a revolving steel barrel where water and bituminous binder are added, and the aggregate is heated by hot gases drawn in by a centrifugal fan. As the water evaporates it is replaced by molten binder. Fine particles remain in the mix so that stack emissions are dust free. The process has the capability to use wet or dry aggregates, and the water content can be adjusted to optimum levels by the use of moisture sensors. This capability makes possible wet screening in mineral dressing plants and removes dust hazards.

26854

APTIC NO. 48595

POWER'S 1972 ENVIRONMENTAL AWARDS. *Power*, 116(11):11-13, 24-27, 32-33, 39, 43, 45, 49, 51, Nov. 1972.

Industrial and power plant solutions to the problems of solid waste disposal and air and water pollution are described. The control measures include an oxygen reactor for odor elimination and waste water treatment at a pharmaceutical plant; a pulp and paper manufacturer's incineration system for both odorous fuel-rich and lean gases; cooling towers for a coal-fired power station and a hydroelectric plant; electrostatic precipitators for control of fly ash emissions at both plants; an aluminum sulfate flocculation process for removing oil from waste water of an axle treatment plant; a hydrocracking process for Alaskan crude oil; a refuse collection service for 120 industrial plants; burning of municipal waste in a power plant boiler; burning of coffee grounds in a steam generator; an absorption process for sulfur dioxide emitted by Claus sulfur recovery plants; a steel plant's water cleaning, cooling, and reuse program that handles three separate streams; and the use of a venturi scrubber and mist eliminator to treat steel plant waste gas.

26859

26855

APTIC NO. 48596

PRESSURIZED FLUID BED COAL COMBUSTION.

Combustion, 44(4):27-20, Oct. 1972.

A pilot plant is being built to determine the feasibility of burning coal under high pressure in a fluidized bed of limestone to produce large amounts of heat while reducing sulfur oxides emissions. The unit will operate at up to 10 atm with a heat release rate of 6 million Btu/hr, equivalent to a power plant capacity of approximately 635 kw. The calcium sulfate formed by the reaction of limestone and sulfur from the coal will be regenerated to limestone in a separate fluidized bed reactor by reaction with a reducing gas at 2000 F. Preliminary experiments indicated good activity maintenance of the lime cycled back and forth between combustion and regeneration. The make-up requirement for fresh limestone was about 15% of that required for once-through use of this material. Reductive regeneration of the sulfated lime yielded an off-gas containing 7-12 mole% SO₂. This concentration is sufficient to permit conversion to sulfuric acid or elemental sulfur.

26856

APTIC NO. 48601

ELECTRICITY HELPS MAKE SMOKELESS FUEL.

Elec. Rev. (London), 191(10/11):341-343, Sept. 8/15, 1972.

The coal/oil distillation and phenol plant which produces smokeless fuel and associated by-products is discussed. Operation processes are described. By-products from the processes include gas, which is recycled for heating the retorts. Condensate coal/oils and liquors are extracted and receive primary treatment before dispatch to a central refinery. New electrical services were installed, including motor and control gear, and lighting equipment. All plant processes and equipment are run on electricity; the electrical installations and cost are described.

26857

APTIC NO. 48614

PROGRESS ON THE CAFB PROCESS FOR REMOVING

SULPHUR FROM FUEL OIL. *Steam Heating Eng. (London)*, 42(491):14-17, Oct. 1972.

A chemically active fluidized bed (CAFB) process was developed for use in conjunction with oil-fired equipment to reduce sulfur oxide emissions from power plant flue gases by over 90%. The CAFB process consists of a shallow fluidized bed of lime particles into which a high sulfur heavy fuel oil is injected. The fuel oil is cracked and gasified by the high temperature lime bed which removes almost all of the sulfur in the oil; the hot gasified oil is then combusted in a slightly modified burner unit with additional air. Process design and mechanics and industrial applications are reviewed.

26858

APTIC NO. 48616

WASTE TREATMENT AT PORT TALBOT. *Effluent*

Water Treat. J. (London), 12(8):420-421, Aug. 1972.

Controlled incineration is the most efficient method available to modern industry of dealing with organic liquid pollutants. A waste treatment operation was expanded to handle 40,000 t/yr of toxic wastes. The disposal methods, plan of operation, and controls are reviewed. Vapors generated in the course of incineration pass through gas scrubbers to remove the soluble toxic products before neutralization and safe discharge to the atmosphere.

26859

APTIC NO. 48617

NEW AIR FILTRATION PROCESS SAVES ROOFING PLANT IN POLLUTION CRISES. *Ind. Wastes*, 18(5):54-55, Sept./Oct. 1972.

A plant producing asphalt roofing materials was threatened with shutdown when liquid contaminants from its asphalt saturators polluted the atmosphere and left a musty odor in the surrounding residential neighborhood. Control of odors and droplets was achieved with two High Energy Air Filter Systems (HEAF) that combine a fiber glass mat with high air velocities to filter the air. Each HEAF unit works with two

fans: a small booster fan brings vapors to the filter, and a 150-hp fan, producing 20,000 cu ft/min air, sucks the particles through the fiber glass mat. As they coat the fibers in the mat, particles form large droplets. These droplets are carried away in the high-velocity airstream and trapped in a low-velocity mist separator. Ninety-five to 98% efficiency claims are made for the units.

26860

APTIC NO. 48635

TRAP FOR EXHAUSTED LEAD. *New Scientist*, 56(819):335, Nov. 9, 1972.

The development of a lead trap silencer for car exhaust systems is discussed. The lead trap silencer is a sheet metal container packed with stainless steel wool which has been coated with alumina. Lead compounds are held in the silencer by a combination of chemical reactions with alumina, adsorption, and physical filtration. Bench and road tests show that the system can reduce lead emissions from a car by up to 70%, with no significant effect on vehicle performance. All tests were conducted on hand-made silencers; production techniques have yet to be developed for manufacturing the lead trap silencers on a production line.

26861

APTIC NO. 48680

BIG SRC PILOT UNIT UNDER CONSTRUCTION. *Oil Gas J.*, 70(45): 32-33, Nov. 6, 1972.

A pilot plant which will use the solvent refined coal process (SRC) is discussed. The SRC process can produce a solid coal product containing less than 1.0 wt% sulfur and 0.1 wt% ash. The product has a heat content of 16,000 Btu/lb. The process will convert subbituminous coal and lignite to the 16,000 Btu product also. Economic effects of the energy supply pattern of relatively pollution-free coal, and the price of coal are reviewed. The SRC process and the pilot plant are described.

26862

APTIC NO. 48691

ADVANCED MELTING TECHNOLOGY AT LANDORE: BSC CUPOLA PLANT INCORPORATES UNUSUAL FEATURES. *Foundry Trade J.*, 133(2913):411-414, 417-420, 422, Oct. 5, 1972.

The design and operation of a 35-42 ton/hr hot-blast cupola employed by the British Steel Corp. in the production of iron for ingot-moulds is described. The cupola incorporates pressurized slag skimmers. Charging is carried out via an automatic analogue controlled S-type swivel charger. Metal runs directly into one of two 25-ton capacity shaking ladles for subsequent treatment and alloying. Hot effluent gases are bled off the cupola through a high-level collection annulus and passed, via a cyclone dust collector, to a pre-cooler vessel. The clean gas is then passed to a recuperator section and burned in a combustion chamber with three burners: main, auxiliary, and pilot. The main burner handles the cupola gas; the pilot burner initiates and maintains combustion of the gas; the auxiliary burner supplements the main burner if the quantity or quality of cupola gas is insufficient to maintain the required hot-blast temperature. Combustion products pass through heat exchangers before being vented through the stack. The hot-blast cupola/shaking ladle combination produces an iron containing 3.1% carbon, 1.4% silicon, 0.15% sulfur, 0.10% phosphorus, and 0.5% manganese. The composition of the molten metal can be adjusted by mixing with additions such as coke breeze, ferro-silicon, ferro-manganese, lime, and aluminum. Plant operation is fully automated.

26863

APTIC NO. 48701

Eerste Nederlandse Cement Industrie, Maastricht
EERSTE NEDERLANDSE CEMENT INDUSTRIE AT
MAASTRICHT. *Cement Technol.*, 3(5):171-178, Sept./Oct. 1972.

A cement works plant in the Netherlands is described. Manufacturing operations are discussed, including preparation of the raw material and the slurry, kiln operation, preparation of the

coal and shale for the kilns, clinker storage, slag operations, and transportation. Coarse and fine dust is recovered from the kiln flue gases by electrostatic precipitators, and passed on into the production cycle, where along with shale it forms clinker, or is added to the meal in the dry kilns. The fine dust contains potassium compounds which, when collected, are sold as a fertilizer ingredient. The flue gases pass through a fan which regulates the kiln draught, and are allowed to escape through the flue. Samples of finished products are analyzed at the plant laboratory. A list of plant equipment, mills, basins, and storage facilities is presented.

26864

APTIC NO. 48709

ORE HANDLING SYSTEM AND SINTER PLANT FOR ALTOS HORNOS DE VIZCAYA. *Steel Times (London)*, 200(10):731-734, Oct. 1972.

A new ironmaking plant in Spain was designed for an initial capacity of 2000-3000 t/day of iron with possible expansion to 6000 t/day. The ore handling and sinter facilities at the plant are described in detail. The stipulated outlet dust burden from plant stacks is 0.1 g/N cu m. To achieve this level, multiple-stage, high-efficiency catch space electrode-type electrostatic precipitators were installed for the treatment of gases from the sinter machine, sinter fan, and sinter screen. Bag filters were chosen for the limestone and ore crushing plants and the blast furnace bunker line system.

26865

APTIC NO. 48710

INLAND S NEW MELT SHOP ON DISPLAY. *J. Metals*, 24(11):32-36, Nov. 1972.

A new electric furnace and billet caster shop produces a wide variety of billets from molten steel. The billets are subsequently processed into carbon and alloy quality products. Fumes generated during melt-down and refining in the electric furnace are drawn through ducts to a baghouse containing 20 compartments each with 120 bags. Any dust or fumes generated during charging or tapping of the furnace collect in an overhead canopy hood connected to the baghouse. Periodically the air flow of the system's fans is reversed, causing the accumulated dust to fall into hoppers that transfer the dust to a balling machine for treatment before disposal. Scale water from the continuous casting operation is purified in a deep-bed filtration system. The clean water is then processed in a cooling tower and recirculated back to the caster.

26866

APTIC NO. 48731

Nitto Boseki K. K. (Japan)
THE DRY-TYPE DUST COLLECTION OF AIRTIGHT ELECTRIC FURNACES. (*Mippeiishiki denkiro no kanshiki shujin*). Text in Japanese. *Ferroalloy (Ferroalloy)*, 21(3):152-154, Dec. 1972.

A new dry-type dust collector for a closed electric furnace is described. The dust collection system consists of a first stack which allows gases which require no treatment to discharge, a gas cooler, a bottom-inlet bag filter with nine chambers, an airtight dust depositor, an air blower, a water layer adjuster, and a second stack. Nitrogen can be introduced into the dust collector in case of emergency. Warning devices are equipped for giving warnings of high bag inlet temperature, high bag pressure loss, high blower suction pressure, low oil pressure, low cooling water pressure, abnormal dust deposit, stopping of blower, or an oxygen emergency. Dozens of advantages of the system are listed including low running cost, high safety, and the elimination of secondary pollution by waste water.

26867

APTIC NO. 48752

HERCULES PARLIN PLANT POLLUTION CONTROL FACILITIES FINISHED -- COST \$4 MILLION. *Am. Paint J.*, 57(24):39-40, 42, Nov. 27, 1972.

New pollution abatement facilities were installed at a cost of over \$4 million at the Hercules Parlin Plant. The primary purpose of the facilities is to reduce nitrogen oxide, sulfur diox-

CONTROL METHODS

26874

ide, and particulate emissions. The thermal-oxidizer system breaks down the nitrogen oxide into nitrogen, oxygen, and water. Coal-burning generators were replaced with oil-burning generators, reducing SO₂ and particulate emissions. The plants major products are chemicals used in a variety of paints, lacquers, and chemical products.

26868

APTIC NO. 48904

Japan Environmental Agency

NITROGEN OXIDE CONTROL MEASURES BY THE INDUSTRIES. (*Sangyokai no chisso sankabutsu taisaku ni tsuite*). Text in Japanese. 14p., Oct. 1972.

The present conditions and the countermeasures of the nitrogen oxides formation at various industries are given. The NO_x concentration could be reduced from the present value of 350-500 ppm to 200-250 ppm by boiler manufacturers by adopting low oxygen operation, two-stage combustion, flue gas recycling, and the improvement of burner structure. Boiler at electric power plants emit 160-950 ppm NO_x depending on the fuel, the highest for coal and the lowest for gas. All major power plants were planning for reduction of NO_x concentration from boiler by reconstruction. Investigation at 203 iron refinery facilities showed that sintering furnace emitted up to 350 ppm of NO_x, boiler up to 580 ppm, coke furnace up to 440 ppm, and heating furnace up to 424 ppm. The reduction of NO_x concentration from a heating furnace is the most difficult. Average NO_x concentration from heating furnaces at a petroleum refinery was 250 ppm and was expected to be reduced by changing the conditions of combustion.

26869

APTIC NO. 48898

CARBON BLACK PLANT SENDS AIR POLLUTION PACKING. *Chem. Week*, 111(20):55-56, Nov. 15, 1972.

Bag filters of silicone-coated glass cloth enable a large carbon black plant to collect and package 2 million lbs/yr of product that formerly escaped through the stacks. The collected black does not penetrate the pores of the glass cloth, does not adhere to the bag, and is easily discharged when the bag is shaken and flexed by reversed air flow. Pneumatic conveyors transport the power from collecting hoppers to an automatic packaging device capable of filling 3600 bags/day.

26870

APTIC NO. 48903

CONSOL S FAR-FLUNG RESEARCH AND ENGINEERING ORGANIZATIONS. *Coal Age*, 77(10):139-156, Oct. 1972.

Research and engineering activities at four Consolidation Coal Company development centers are described: the Lee Engineering Division, the Research Division, the Mining Research Department, and the Scientific Systems Group (computers). The Research Division is studying several alternatives for making clean power fuel from coal. Its projects include a coal gasification process in which dolomite is used to pick up carbon dioxide and liberate heat for use in gasification; a process to convert coal to ash and sulfur-free liquid fuels; a continuous carbonization process for a clean, nonpolluting coke; and a liquid sulfur dioxide scrubbing process. In this process, SO₂ in flue gas is absorbed by a concentrated potassium salt solution. The resulting thiosulfate is reactivated at higher temperatures to produce hydrosulfide, which is stripped with carbon dioxide and steam to release hydrogen sulfide. Elemental sulfur is recovered from the H₂S in a Claus reactor. The process permits simultaneous removal of SO₂ and particulates.

26871

APTIC NO. 48905

CONSOL S APPROACH IN TODAY S WORLD OF MINING. *Coal Age*, 77(10): 101-121, Oct. 1972.

Programs to improve Consolidation Coal Company's deep mining, surface mining, and coal preparation processes are reviewed. Present and projected methods of roof support, dust control, suppression of dust-caused explosions haulage, and

blasting are described. Coal-cleaning facilities in new mines are illustrated in flow diagrams. In a typical design, the feed rate into the plant is 560 tons/hr and clean coal recovery is 425 tons/hr. The product assays from 5.0-5.5% ash, 5% total moisture, and a maximum of 0.8% sulfur. Major equipment items are heavy-medium cyclones to clean 2-inch by 8-mesh raw coal; water-only cyclones to wash the minus 8-mesh fraction; wet water tables to rewash the 8 by 150-mesh water-cyclone rejects; froth flotation to treat minus 28-mesh material; horizontal centrifuges to dewater 3/4-inch by 8-mesh coal; and thermal dryers for 2-inch coal. Mechanical water clarification system and settling ponds prevent the release of solids into natural drainage ponds. Company power distribution systems and maintenance operations at underground and surface mines are also discussed.

26872

APTIC NO. 48908

Humble Oil and Refining Co.

CONVERSION FROM NATURAL GAS TO OTHER FUELS. *Brick Clay Rec.*, 16(4):30-33, Oct. 1972.

Practical replacements for natural gas are coal, heavy fuel oils, middle distillates, and liquefied petroleum gas (LPG). The advantages and disadvantages of each fuel are discussed with respect to the following: cost/Btu of useful energy; availability, handling, and storage; combustion equipment requirements; pollution; and safety. There are essentially no pollution problems with LPG and only minimal emission problems with middle distillates. Heavy fuel oils vary in sulfur content and consequently in pollution potential. Combustion of coal produces atmospheric contaminants that are, with present technology, expensive to control. Conversion to LPG would require only minor alterations to existing combustion equipment.

26873

APTIC NO. 48923

SUMMARY OF DESULFURIZATION PROCESSES FOR FLUE GAS AND CLAUS UNIT TAIL GAS. *Proc. Am. Petrol. Inst., Div. Refining*, vol. 52:228-231, 1972. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

Desulfurization processes for flue gases and Claus unit tail gases are summarized. The originating company, process description, technical status, and application are tabulated for alkaline additive-scrubbing methods, reduction processes, the citrate process, activated carbon adsorption, absorption, molten carbonate, catalytic oxidation processes, chemical reaction methods, and various modified processes.

26874

APTIC NO. 48481

Akiyama, T. and H. Sakano

PERFORMANCE OF A CATALYST HEATING-TYPE CARBON MONOXIDE REMOVAL DEVICE. (*Shokubai kanetsugata issankatanso jokyosochi no seino*). Text in Japanese. *Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo)*, 10(6):36-43, Dec. 1972. 6 refs.

A manganese dioxide catalyst can oxidize carbon monoxide of a 1% or lower concentration. Humidity can adversely affect this reaction. The catalyst or the air should be heated to oxidize small quantities of CO. A catalyst-heating CO removal device equipped with a built-in regenerative heat exchanger is discussed. The system has a blower, heater, and catalyst unit between the polluted air intake and the clean air discharge sides of the regenerative heat exchanger. The air intake side has a pre-filter and an electrostatic precipitator; the clean air side has a deodorizing filter and fin cooler. The packing density of the catalyst is 360 kg/cu m with an air velocity passing through the catalyst unit limited to 0.3-0.6 m/sec. The system was placed in an underground parking lot to examine the CO removal efficiency. The initial indoor CO concentration of 21-22 ppm was reduced to 60% of the initial value in 1 hr and to 4-5 ppm in 3 hr.

26875

26875

APTIC NO. 48871

Arita, Yukio and Takeji Matsumoto

SMOKE EXHAUST DEVICE. (Haiei sochi). Text in Japanese. (Mitsubishi Heavy Industries, Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-50691. 6p., Dec. 20, 1972. 1 ref. (Appl. Aug. 13, 1963, 1 claim).

A multi-stack chimney was designed for more effective diffusion of stack gases. According to the invention, four independent stacks are erected slanting upward so that they may meet each other. The portions of the four stacks above their meeting point are upright and stand parallel to each other with a narrow space between them. These upright portions of the stacks are held together by a supporting plate which also covers the narrow space formed between them. Each stack is connected to a source of stack gas emission that can be a boiler in a thermal power plant. The upper, upright portion of each stack may be a quadrant-shaped tube so that the four stacks may form a circular shape when put together as mentioned above. If two stack gas emission sources must be controlled, two stacks of this multi-stack chimney are connected to each source. If four, one stack is connected to each source. When the sources of stack gas emissions such as boilers are operating to their full capacity and the flow speed of the gas in each stack is adjusted to the same velocity, the gases will be discharged with the same velocity into the atmosphere and combine with each other to form a large flux of gas containing no air currents since no air will be permitted to ascend through the space between the four stacks due to the supporting plate that closes the space. Therefore, momentum given by this large flux of the gas outflow is much greater than that given separately by the gas from each stack, thus making the discharged gas ascend much higher.

26876

APTIC NO. 48560

Atsukawa, Masumi

DESULFURIZATION ENGINEERING OF WASTE GAS. (Haiei datsuryu gijitsu ni tsuite). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, p. 31-51, 1972. 33 refs. (Presented at the Seminar on Recent Technology on Public Pollution Control, 370th, Fukuoka, Japan, Dec. 11-12, 1972.)

Stack gas desulfurization processes have been well publicized, however, only a few are practical and can meet both technical and economic demands. Lime slurry scrubbing, magnesium oxide slurry, Wellman-Lord absorption with sodium sulfite, and catalytic oxidation are the leading processes. Desulfurization plants in Japan are classified into non by-product recovery and by-product recovery plants. The former are small scale plants (20,000-50,000 N cu m/hr capacity) since the waste water or waste solids form secondary pollutants; the latter processes have greater gas absorbing capacity than the non-recovery methods. The sodium sulfite recovery process can treat flue gas quantities of 200,000-300,000 N cu m/hr; however, the marketability of sodium sulfite as a by-product is not promising. The Wellman-Lord process produces a sodium sulfate by-product. A lime scrubbing process sulfate by-product. A lime scrubbing process producing a gypsum by-product can process 100,000 N cu m/hr of gas without producing any waste water or solids; the marketability of the by-product, calcium sulfate, is most promising. Several processes yield sulfur as a by-product. Several types of scrubbers are illustrated, and demand and supply statistics are given for various desulfurization by-products including sodium sulfite, sodium sulfate, ammonium sulfate, sulfur, sulfuric acid, and gypsum.

26877

APTIC NO. 48592

Avdeyenko, A. N., A. M. Shteynberg, S. I. Kuritsyn, V. V. Arsenyev, and N. A. Arkhipov

ACOUSTIC TREATMENT OF GASEOUS EMISSIONS GENERATED BY OPEN-HEARTH FURNACES AND SINTERING MACHINES TO INCREASE THE EFFICIENCY OF GAS PURIFICATION. (Akusticheskaya

AIR POLLUTION ABSTRACTS, MAY 1973

obrabotka otkhodyashchikh gazov martenovskikh pechey i aglomashin dlya povisheniya effektivnosti gazoochistki). Text in Russian. Stal, no. 10:964, 1972. 4 refs.

The effect of the acoustic pretreatment of gaseous emissions from open-hearth furnaces and sintering equipment during oxygen blow periods on the efficiency of the subsequent dust separation in electrostatic precipitators and cyclones was studied. The gases from the waste heat boiler of an open-hearth furnace had to pass an acoustic field of an intensity of 0.08 W/sq cm generated by steam whistles at a frequency of 7 kcs. With a specific steam expenditure of 2.7 kg/1000 cu m, the efficiency of the electrostatic dust precipitator increased from 87.3 to 90.3%, while the residual dust concentration decreased by 25%. Similar acoustic treatment of sintering equipment waste gases resulted in a reduction by 37% in the residual dust concentration, the specific steam consumption being 1.3 kg/1000 cu m.

26878

APTIC NO. 48784

Bade, E.

CONCEPTION AND CONSTRUCTION OF THE FIRST COUNTER-CURRENT VERTICAL CLINKER COOLER FOR 3000 TONS/DAY. (Konzeption und Erstaufuehrung des Klinker-Gegenstrom-Schachtkuehlers mit einer Leistung von 3000 t/d). Text in German. Zement-Kalk-Gips (Wiesbaden), 25(12):616-623, 1972. 9 refs.

The major criterium for selecting the counter-current vertical cooler is the protection of the environment. The entire emitted dust quantity is not to exceed a certain quantity. This is feasible only by reducing the waste gas quantity which only a clinker cooler without cooler waste air could fulfill. Two systems are available the satellite cooler and the counter-current vertical clinker cooler. Since the first cooler is too noisy the choice fell on the second cooler. The cooling principle of the counter-current vertical (or shaft-type) clinker cooler is based on a subdivision of the clinker column in the shaft into a fluidization zone (fluidized bed cooling) and a static zone underneath (convective cooling). This arrangement results in high heat transfer coefficients (fluidized bed) in combination with verifiable controllable material discharge (static layer of material). The introduction of this type of cooler into the cement industry was accomplished in three stages corresponding to throughputs of 110, 500, and 1000 t/day. The experience gained in all stages was utilized in the design of the new plant with a throughput capacity of 3000 t/day. The new plant is described, with special reference to its mechanical equipment, process engineering aspects, and measuring and control technology.

26879

APTIC NO. 48956

Baker, Alan

EMISSIONS AND NOISE. J. Automotive Eng., 3(2):32-36, Feb. 1972.

Research programs developed by an engine research company are reviewed. The anti-pollution research in progress involves studies on controlling the formation of pollutants within the combustion chamber and reducing the amount of emissions in the exhaust. Diesel engines and exhaust, exhaust gas recirculation systems, test engine design, afterburners, exhaust emission measurement methods, and vehicle noise reduction are also included into the study programs.

26880

APTIC NO. 48587

Ball, F. J., G. N. Brown, J. E. Davis, A. J. Repik, and S. L. Torrence

TAKE SULFUR OUT OF WASTE GASES. Hydrocarbon Process., 51(10): 125-127, Oct. 1972. 3 refs. (Presented at the American Petroleum Institute, Division of Refining, New York, May 1972.)

A cyclic, dry process was developed to remove 98.5% of the sulfur dioxide from Claus incinerated off-gas containing 1.77%

SO₂. The process is based on removal of SO₂ with dry activated carbon and conversion of the sorbed material to concentrated SO₂ or elemental sulfur. The carbon catalyzes the conversion, at 150-300 F, of SO₂, oxygen, and water vapor in Claus tail gas to sulfuric acid. The H₂SO₄ formed remains sorbed in the carbon's pores. Conversion of the sorbed acid to SO₂ is accomplished by reaction with hydrogen sulfide in a regenerator/stripper. The H₂S first homogeneously converts the desired proportion of adsorbed acid to elemental sulfur at 300 F. Subsequently, the carbon containing the sulfur/sulfuric acid mix is heated to 600 F to produce concentrated SO₂ (90%), which is fed directly to the Claus unit. The regenerated carbon is cooled and recycled for reuse. If the ratio of H₂S to H₂SO₄ is increased to three, elemental sulfur can be vaporized from the carbon, condensed, and collected as a product. All steps of the process are carried out in multistage fluidized beds. For a 400 t/day Claus unit, the estimated capital and annual operating costs of the process are \$760,000 and \$350,000, respectively.

26881 APTIC NO. 48925

Ball, F. J., G. N. Brown, J. E. Davis, A. J. Repik, and S. L. Torrence

DIRECT RECOVERY OF SULFUR FROM STACK GASES WITH A FLUIDIZED ACTIVATED CARBON PROCESS. *Proc. Am. Petrol. Inst., Div. Refining*, vol. 52:232-246, 1972. 3 refs. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

An all dry process using fluidized beds of activated carbon was developed to remove sulfur dioxide from waste gas streams and directly release either elemental sulfur or concentrated SO₂ as a by-product. The process has particular application to Claus units since the hydrogen sulfide required in regeneration is already available and very low levels of SO₂ could be effected. Reactor design relationships developed in bench scale and continuous pilot units, process chemistry and development, operating variables, and economic aspects are reviewed. (Author abstract modified)

26882 APTIC NO. 48926

Beavon, David K. and Raoul P. Vaell

THE BEAVON SULFUR REMOVAL PROCESS FOR PURIFYING CLAUS PLANT TAIL GAS. *Proc. Am. Petrol. Inst., Div. Refining*, vol. 52:267-276, 1972. 1 ref. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

The Beavon sulfur removal method for the purification of Claus unit tail gas to well below the level of 250 ppm of sulfur dioxide content with high reliability is reviewed. Process fundamentals and reactions, operating variables, by-product recovery, economics, and process reliability are examined. The process combines hydrogenation, cooling, and wet oxidative extraction and yields a sulfur by-product.

26883 APTIC NO. 48901

Billet, R.

THE ABSORPTION OF NITROGEN OXIDES. *Brit. Chem. Eng. Proc. Tech.*, 17(9):705-708, Sept. 1972. 10 refs.

In a laboratory test, the effect of cooling tube arrangement on nitrous gas absorption efficiency was determined for two different designs of bubble-cap tray. One design consisted of cooling tubes arranged in a rhomb around a bubble cap of 102 mm diameter with triangular slots. In the other design, the cooling tubes were arranged in a square around a cap of 78 mm diameter with rectangular slots. Although both bubble caps had almost the same maximum gas load, the absorption efficiency of the second arrangement in the range of loading investigated was 5-18% better than in the first. The increased efficiency was due to better liquid flow patterns. The arrange-

ment of cooling tubes in a square around the bubble cap was tested in a commercial-scale plant. The results confirmed that at constant gas-liquid ratio the absorption efficiency decreases with increase in gas load and at constant gas load it decreases with increase in gas-liquid ratio. The converse was true for heat transfer in the cooling tube system. (Author summary modified)

26884

APTIC NO. 48888

Blee, T. J., J. A. T. David, and N. Hunt

EMISSION CONTROL BY FUEL INJECTION. *J. Automotive Eng.*, 3(2):8-14, Feb. 1972. 13 refs.

An electronic fuel injection system was used to establish the factors in an internal combustion reciprocating engine which control exhaust emissions. Fuel system design, emission generation, inlet system, combustion, and exhaust system processes, and vehicle specifications are defined. The system was effective for hydrocarbon and carbon monoxide control but had little effect on nitrogen oxide emissions. The present approach to control NO_x is to operate on the lean side of stoichiometric air/fuel ratio, using ignition retardation as a means of reducing peak-cycle temperatures. Such an approach favors larger engines, enabling them to meet the regulations up to 1975. Smaller engines require other control methods to meet NO_x limits, such as: rich air/fuel ratios with HC and CO controlled by an air injector reactor or lean ratios with a simple thermal reactor; ultra-lean ratios using improved combustion systems; combining ignition retard and exhaust gas recirculation; and catalytic reactor system; water injection into the inlet manifold.

26885

APTIC NO. 49004

Breisacher, Peter, Roberta J. Nichols, and William A. Hicks

EXHAUST EMISSION REDUCTION THROUGH TWO-STAGE COMBUSTION. *Combust. Sci. Technol.*, 6(4):191-201, Dec. 1972. 9 refs.

The control of exhaust emissions from the internal combustion engine is discussed. Emissions can be controlled through a two-stage combustion process, achieved with a relatively simple engine modification. The engine is fitted with a small prechamber in the normal spark plug hole. This small chamber burns a spark-ignited fuel-rich mixture, which in turn ignites a fuel-lean mixture in the main chamber with a flame. Overall air-fuel ratios as high as 29:1 were obtained in the experiment, with smooth engine performance and only a 20% power loss. Engine speeds ranged from 1800 to 2800 rpm; the loads varied from 20% to 100% maximum. Carbon monoxide was reduced by five orders of magnitude, the oxides of nitrogen by 50-75%, and the hydrocarbons by 40-50% from levels measured in the basic engine at the same compression ratio test points. (Author abstract modified)

26886

APTIC NO. 48628

Butler, John D.

CONTROLLING EMISSIONS FROM MOTOR VEHICLE EXHAUSTS. *Chem. Brit.*, 8(6):258-260, June 1972. 18 refs.

The control of emissions from motor vehicle exhausts is discussed. The formation of hydrocarbons, carbon monoxide, and nitrogen oxides in an internal combustion system is reviewed. Control solutions include engine design and operation modifications and the development of catalytic systems. The characteristics and advantages of each are described. The catalytic decomposition of nitric oxide and the catalyzed CO-NO reaction is explained. Research on the control of automobile emissions frequently involves engine trials, road tests, and the development of effective catalysts. Exhaust gas emission standards for 1975 are 40 ppm of HC, 0.5% CO, and 225 ppm NO_x; standards for 1980 are 20 ppm, 0.2%, and 100 ppm, respectively. Typical exhaust gas compositions from an untreated vehicle are 100 ppm HC, 1.3% CO, and 850 ppm NO_x;

26887

while exhausts from cars equipped with a dual bed catalyst contain 37 ppm, 0.3%, and 88 ppm of HC, CO, and NOx, respectively.

26887

APTIC NO. 48531

Cecil, Lawrence K.

MANAGE THE ENVIRONMENT WITH IMAGINATION.

Hydrocarbon Process., 51(10):79-83, Oct. 1972.

Petroleum plant managers and operators are conscientious about keeping burnable organic wastes cleaned up and explosive vapors contained. They are less careful about drips, small leaks into water, escape of odorous nonexplosive vapors, and nonburnable sludges. Good housekeeping will often reduce by 50% the load on a waste treating system. Specific air pollutants can sometimes be eliminated by process modifications such as: fuel oil or stack gas desulfurization, product recovery, flares, or scrubbing. Development of water treatment technology is proceeding in two directions. One is the use of columns of solid reagents for specific reactions, such as aluminum oxide for phosphate removal, cation exchangers (siliceous and resinous) for ammonia removal, or activated carbon for organic adsorption. Another such solid reagent is fixed enzymes. The other direction is to processes such as distillation, freezing, and semipermeable membrane operations. Reverse osmosis can remove several hundred mg/l suspended solids, nearly all organics except phenol and low molecular weight compounds, and 90% or more of dissolved mineral salts. The choice of a process for control of particulate emissions should be limited to those that can handle both particulates and sulfur dioxide. The petroleum plant may be able to recycle some of its dry solid wastes, particularly metals. For most solid wastes, the solution is incineration.

26888

APTIC NO. 48476

Cheremisinoff, P. N. and K. B. Rao

FLUIDIZED BED REACTORS. *Pollut. Eng.*, 4(6):48-50, Sept. 1972.

The pollution control applications of fluidized bed reactors are discussed. Coal-burning power plants can use fluid beds to fix sulfur dioxide as calcium sulfate by reaction with dolomite. This is accomplished at fluidizing velocities of 1.5-3.0 ft/sec and residence times of 1-2 sec. Sulfur dioxide and hydrogen sulfide at low concentrations are desulfurized in a fluid bed of iron oxide. The ferric oxide is converted to ferric sulfide during the process; this can easily be regenerated to produce concentrated SO₂. Nonclogging fluid bed absorbers, or turbulent contact absorbers, are useful when a solid is present in the gas stream or is formed by reaction of contacting solids. Adsorption of odors or taste from water by carbon requires maximum utilization of the carbon surface area. This criterion is easily achieved in a fluid bed because of the intimate mixing of solids and liquids. Fluid beds are also used for incineration of municipal sludge, pyrolysis or municipal solid waste, and pyrolysis of pulp industry solid waste.

26889

APTIC NO. 48914

Conrad, Guenter

PREPROCESSING IN CRUSHER/DRYER IMPROVES MILLING EFFICIENCY. *Rock Prod.*, 75(11):102-104, 129-130, Nov. 1972.

A normally operated ball mill requires 0.5-1.5 standard cu m of air/kg of raw material. The difference between this and the amount of kiln exit gases produced/kg of clinker means that some kiln gas is wasted instead of being used for drying raw material. Furthermore, kiln gas is not hot enough to dry raw materials with initial moisture content above 7%. These disadvantages are eliminated by preprocessing raw materials in an impact crusher/dryer. Despite the expenditure of additional crushing energy, the total energy used in crushing and grinding is reduced. The capacity of a limestone mill was increased from 26-40.5 tons by a crusher/dryer; the specific power

AIR POLLUTION ABSTRACTS, MAY 1973

requirement for the whole plant was simultaneously reduced by 23%. In a case where marl was the feed material, the capacity of two ball mills was increased 100% by precrushing in a crusher/dryer using nothing but kiln exit gases. The power requirement was reduced from 21.5 to 12.5 kw/hr/ton. In another case, a crusher/dryer raised the effective throughput of a mill from 110-151.5 tons/hr. The initial moisture content of 7% was reduced to 2.5% in the crusher/dryer and to 0.5% in the ball mill by heating with kiln gases. When the initial moisture content exceeded 7%, the kiln gas temperature was boosted by a standby furnace generating 2000 F. Any type of dust collector can be used with crusher/dryers.

26890

APTIC NO. 48961

Corner, E. S.

OCTANES ON THE ROAD -- LEADED AND UNLEADED. *Proc. Am. Petrol. Inst., Div. Refining*, vol. 52:25-47, 1972. 2 refs. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

Antiknock performance of fuels in 1968, 1969, and 1970 cars was examined. On a maximum octane number requirement basis, depreciation increased from the 1968 through 1970 models. Motor octane number quality was twice as important as research octane number in 1968 and 1969 models and nearly four times as important in 1970 models. In 1970 model cars, an unleaded fuel series was fully equivalent to leaded fuels. The differences in dynamometer versus actual road test results were studied. No differences were determined for 1964-1967 models; consistently higher depreciations, highly significant statistically, were determined on dynamometers for 1968-1971 cars on all fuels. The difference was especially pronounced for an unleaded series in 1971. (Author abstract modified)

26891

APTIC NO. 48919

Craig, Thomas L. and Brian H. Potter

W-L PROCESS -- APPLICATIONS IN THE FUELS INDUSTRY. *Proc. Am. Petrol. Inst., Div. Refining*, vol. 52:277-281, 1972. 1 ref. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

The Wellman-Lord sulfur dioxide recovery process is reviewed with respect to applications, economics relative to the use of low-sulfur fuels, and the fate of high-sulfur residuals or cokes in refinery operations. The process can be applied to rich-SO₂ streams in sulfuric acid plants treating refinery sludge acids, Claus unit incinerators, petrochemical complexes, and power generating stations. The process is a simple wet regenerative system using a sodium-sulfite-rich solution of sulfite and bisulfite for absorption of the SO₂ from the stack gas. Process improvements are also considered.

26892

APTIC NO. 48671

Crossgrove, G.

GAS TIGHT ISOLATION -- AN INCREASING CONTRIBUTOR TOWARDS CLEAN AIR. *Clean Air*, 2(7):43-44, 1972.

The need for effective isolating valves and dampers in waste gas cleaning plant layouts is discussed. Gas tight isolation enables maintenance for precipitators without danger to personnel or the need for any breathing apparatus. The design and operation of the Metro-Flux spade valve are reviewed.

26893

APTIC NO. 48713

Csathy, Denis G.

HEAT ENERGY CONSERVATION IN REFINERIES. *Oil Gas J.*, 70(44):58-60, 65-66, Oct. 30, 1972. 8 refs. (Presented at the American Society of Mechanical Engineers, Petroleum Division, Pressure Vessel and Piping Conference, 3rd, New Orleans, Sept. 17-21, 1972.)

Refineries can make heat recovery effective and economical in four areas: fired-heater stack gases, catalytic crackers, hydrogen plants, and gas turbines. Six heat-recovery alternatives for fired heaters are described, including waste-heat boilers, an economizer oil heater, a combustion-air heater, and a secondary heat-recovery unit with closed oil-circulating system. Design requirements for steam, water, oil, and air systems are compared. The benefits of using fin rather than bare tubes in heat-recovery equipment are stressed. In recent catalytic cracking installations, carbon monoxide boilers recover chemical energy in addition to the sensible heat of regenerator gas. Watertube boilers are practical when regenerator gas pressure is lowered to near atmospheric upstream of the CO boiler. However, it might be more economical to burn the CO gas in a shop-assembled boiler at the regenerator exhaust pressure of 15-30 psig. In hydrogen plants, fire-tube waste-heat boilers are used to cool the high-pressure gas from the steam-methane reforming furnace. The atmospheric flue gas stream can be cooled by a finned watertube boiler. The selection of heat-recovery equipment for gas turbines follows the same principles as for fired heaters.

26894

APTIC NO. 48570

Dalmon, J. and D. Tidy

A COMPARISON OF CHEMICAL ADDITIVES AS AIDS TO THE ELECTROSTATIC PRECIPITATION OF FLY-ASH. *Atmos. Environ.*, 6(10):721-734, Oct. 1972. 19 refs.

The use of additives, including sulfur trioxide, sulfuric acid, ammonium sulfate, ammonium bisulfate, sulfamic acid, and ammonia, as aids in the collection of pulverized fly ash from coal-fired power stations using electrostatic precipitators was investigated. The experimental procedures, chemical forms of the additives, efficiency, power station test results, and factors controlling the effect of the additives are reviewed. The additives SO₃, H₂SO₄, and (NH₄)SO₄ were economically the most attractive for power station precipitators. Sulfuric acid and (NH₄)SO₄ were easily injected in the form of aqueous sprays. Other additives studied included sodium chloride, calcium chloride, sodium sulfate, lithium iodide, and hydrogen chloride. Additives improved precipitator performance by increasing the flashover voltage. The cohesive properties of ash were related to efficiency only when the resistivity was low. (Author abstract modified)

26895

APTIC NO. 48634

Damske, L. A.

NEW HIGH-GLOSS COATING. *Mod. Packag.*, 45(11):44-46, Nov. 1972.

A new room-temperature-cure thermoset, urethane coating for papers, films, and foils, developed for the flexible packaging and graphic arts industries, is described. The industries had encountered problems while using alkyd amine surface coatings, whose characteristics included the presence of aldehydes exceeding permissible levels and the formation, upon cure, of odoriferous by-products. The new high-gloss coating is a suitable replacement: no equipment modification is necessary, process speeds are faster, and coating weights are lower. Conflict with air pollution control laws is avoided, since the new high-gloss coating contains no aldehydes and does not produce any by-products upon curing. The application process of the new coating is described. The specific properties, including gloss level, rub and abrasion resistance, chemical resistance, and heat resistance are discussed in detail.

26896

APTIC NO. 48981

Dartnell, P. L. and K. Campbell

LEAD EMISSIONS BY MOTOR VEHICLES. (*Emissions de Particules par les Echappements de Vehicules*). Text in French. *Ingrs. Automobile (Paris)*, no. 11, p. 631-638, Nov. 1972.

Particles emitted by motor vehicles were typically made of 24.5 wt% lead, 0.9 iron, 8.6 chlorine, 4.0 bromine, 28.0 carbon, 5.8 hydrogen, 7.3 nitrate ion, 5.4 ammonia, 2.6 alkaline earth metals, hydrocarbon tars, and petroleum mist. The quantity of particles emitted depended on the design of the exhaust system, the engine operating conditions, and the manner of driving. Under certain conditions the emission of particles was greater with clear gasoline than with gasoline containing lead. The method for determining the emission of particles involved preliminary mixing of the exhaust gases with air, and the filtering of a small representative sample; intake of all the exhaust gases in a preconditioned chamber, and sampling for the examination of the matter suspended in air; and finally, the filtering of the total volume of exhaust gases. A method for reducing the particles is being developed, involving the lining of a standard type silencer with steel wool supporting an alumina coating. During tests with this device, the lead emissions were reduced to a fraction of the emissions with standard silencers. The devices did not significantly influence vehicle performance and reduced noise to the level obtained with standard devices. Data for the effects of the filters on particle size, airborne particulates, and lead emissions are presented.

26897

APTIC NO. 48721

Davies, C. N.

FILTRATION OF AEROSOLS. *CRC Critical Rev. Environ. Control*, 3(1):99-120, Aug. 1972. 33 refs.

When efficient removal of submicron aerosol particles is required, fibrous filters are invariably used. Physical principles underlying the various mechanisms of filtration are reviewed and various theoretical expressions for the efficiency of fibrous filters are given. Expressions describing the gas flow field around a single fiber and the effect of gravitation are included. Theoretical and experimental work in the areas of electrical forces, hydrodynamics, diffusion, aerodynamics, filter clogging, filter resistance, and filter pore size is also reviewed. Membrane and rotary impaction filters are briefly described.

26898

APTIC NO. 48602

Davis, Rodney J. and Jack Truitt

USING CONDENSING STEAM FOR AIR CLEANING.

Instr. Control Systems, 45(11):68-70, Nov. 1972. 11 refs.

Air cleaning devices for the removal of particles ranging from about 0.2 to 2.0 micron in diameter are discussed. These fine particles have long airborne lifetimes, are apt to deposit in human lungs, and reduce visibility through urban air. Particle collection efficiencies of fibrous, mat, loaded bag, and absolute filters, of dry inertial devices (cyclones, settling chambers) and wet inertial scrubbers, and of electrostatic precipitators are reviewed. In most cases collection efficiency seems to be a function of particle size. Steam condensation, particle growth, and hydrophilic and hygroscopic particles are described. The collection efficiency of steam condensation, compared with other air cleaning methods, was found in terms of the ratio of observed deposition velocities to the energy flux required. Experimental data showed that particle removal efficiencies may be as high as 90% for steam condensation at 0.0007 g of water/cu cm of aerosol. Steam condensation in conjunction with processes such as turbulent agglomeration followed by inertial sweeping may be advantageous. Costs of particle removal are also considered.

26899

APTIC NO. 48778

Derndiner, Hans-Otto

CLEANING THE EXHAUST GASES OF AUTOMOBILE ENGINES. (*Abgasreinigung von Kraftfahrzeugmotoren*). Text in German. *VDI (Ver. Deut. Ingr.) Z. (Duesseldorf)*, 114(18):1350-1351, Dec. 1972. 5 refs.

With a lean adjustment (operation with excess air) and engine modifications, the hydrocarbon and carbon monoxide concen-

tration in the exhaust gas can be reduced to lower values than presently required in Europe. But these measures do not suffice to meet American regulations of the present and the coming years, and most important, they do not reduce the emission of the oxides of nitrogen. Almost all other measures operate with a fuel surplus (i.e., with higher fuel consumption) or with a very incomplete combustion plus afterburner. A delayed ignition has this effect. As a consequence, fewer NOx are produced. Exhaust gas recirculation is also an efficient method of reducing the NOx. The higher emission of CO and HC can be avoided by the injection of secondary air into the exhaust duct and through delayed ignition. With a moderately rich mixture, CO and the HC burn in the exhaust pipe. With a very rich mixture, a thermal reactor is required. The application of catalysts is reviewed.

26900

APTIC NO. 48551

Dietrich, Hans

DUST FILTRATION WITH NEEDLE FELTS. *Filtration Separation (Purley)*, 9(4):438-440, 442-443, July/Aug. 1972. (Presented at the Filtration Society, Conference on Filtration in Process Plant Design and Development, Dust Control and Air Cleaning Exhibition, London, England, Sept. 28-30, 1971.)

Conventional wool felts and needle felts of man-made fibers are three dimensional filter media. Their element is the single fiber, not a thread or yarn. Wool felts require heat, moisture, pressure, and motion for their manufacture, but needle felts are felted by needle looms. More than 1000 needle penetrations/sq in. can be applied to produce a dense, uniform, and still porous fabric. Needle felts are normally reinforced with a woven insert. This fabric is embedded within the felt and imparts greater strength to the structure while keeping the extension low. Unsupported needle felts get their strength by shrinking highly shrinkable fibers (i.e., polyester or acrylics) in addition to needling. The use of needle felts is governed by filter unit design, especially the cleaning method. The fabrics are suitable for dust collectors with continuous reverse low-pressure air cleaning, continuous low- or high-pressure micropulse cleaning, or pneumatic dust release systems. Factors responsible for the high separation properties of felts are sieve, inertness, trapping, and diffusion effects. Data on permeability, volume/filter area ratio, dust retention, weight, and pore volume of felt fabrics are given. New fibers with high thermal and chemical resistance are discussed. (Author abstract modified)

26901

APTIC NO. 48953

Duffy, Leo J., Neil R. Everett, James J. Sevcik, and Frank J. Piehl

KEEPING THE LEAD OUT OF UNLEADED GASOLINES. *Proc. Am. Petrol. Inst., Div. Refining*, vol. 52:14-24, 1972. 2 refs. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

The nature of the lead contamination problem in the production, blending, and transport of unleaded gasoline is reviewed. Unleaded is defined as a lead content of less than 0.05 g/gal. Analytical methods to determine lead at less than 0.02-0.03 g/gal are reviewed. The sources of lead contamination include the modes of gasoline transportation (pipeline, barge or tanker, and tank truck or rail), residual lead contained in the manifold and tanks at terminals, and contamination at the individual service stations. A monitoring program to control gasoline contamination is considered.

26902

APTIC NO. 48985

Durie, R. A., C. A. J. Paulson, and E. C. Potter

MITIGATING FLY-ASH EMISSIONS IN AUSTRALIA: THE ROLE OF THE CSIRO TESTING FACILITY. *Australian Chem. Process. Eng. (Sydney)*, 25(7):24-30, July 1972. 11 refs. (Presented at the International Clean Air Conference, Melbourne, Australia, 1972.)

An Australian testing facility has the ability to produce fly ash under combustion conditions simulating those in power station boilers, and to pass the fly ash and associated combustion gases directly to an electrostatic precipitator. Results from the test facility indicate that the three dominant variables affecting the performance of full-scale precipitators are electric field, specific collection area, and particle size. The use of effective migration velocity as a parameter of precipitator performance is frequently misleading. It should be replaced by a statement of the observed relation between precipitator efficiency and specific collecting area at stated values of the mean applied field and temperature. Based on tests with 24 Australian coals and one U. S. coal, there is no correlation between precipitator fly ash collection efficiency and coal sulfur content. An increase in temperature from 90-160 C had no significant effect on precipitator efficiency in the case of four Queensland coals and substantially decreased efficiency in the case of the other three coals tested. In two of the last three cases, the current/voltage characteristic of the precipitator was itself temperature-dependent. High resistivity was not a factor.

26903

APTIC NO. 48770

Effenberger, E.

THE TOXIC EFFECTS OF THE COMBUSTION PRODUCTS OF PLASTICS. (*Toxische Wirkungen der Verbrennungsprodukte von Kunststoffen*). Text in German. *Stadtehygiene (Uelzen/Hamburg)*, 23(12):275-280, 1972. 11 refs.

The toxic effects of the combustion products of some plastics were tested in rats. Pine and wool combustion products were used for comparisons. Death rates, carboxyhemoglobin content of blood, and the swim-test (floating test) were measured. The death rate was only greater in the case of polyacryl nitrile than in the case of pine (hydrocyanic acid poisoning). Pine caused higher COHb values than all the other materials. With the swim-test, the strongest reactions occurred in the case of polystyrene, followed by pine, wool, and polyacryl nitrile.

26904

APTIC NO. 48649

Eguchi, Yoshitomo and Fumikazu Ogino

AIR-CLEANING PERFORMANCE OF ACTIVE CARBON AND ITS MEASUREMENT METHOD. (*Kukiseijoyo kasseitan no seino to sokuteiho*). Text in Japanese. *Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo)*, 10(6):2-11, Dec. 1972. 9 refs.

Physical properties of active carbon which affect its performance are discussed. Various methods of measuring the physical properties are mentioned. Active carbon is classified into the powder and granular (molded and crushed) types according to the shape and size of its grains. The carbon can be analyzed by observations with the naked eye or microscopes. The grain size distribution can be measured with a sieve. A standard method for measuring packing density of the active carbon is discussed. Porosity, surface area, and packing density affect the adsorption efficiency of the carbon. Measurement methods for porosity, surface area, pressure loss, and adsorption efficiency are discussed. The pressure loss in a packed column usually includes that attributable to the active carbon layer, the active carbon supporters, the wall effects, and the differential pressure gauge hole.

26905

APTIC NO. 48590

Endo, Akira, Tetsu Takeyama, and Keizo Masuda

METHOD FOR REMOVING NITROGEN OXIDES FROM WASTE GASES. (*Sankachisso o ganyusuru haigasu kara sankachisso o jokyosuru hoho*). Text in Japanese. (Toray Industries Inc., Tokyo (Japan)) *Japan. Pat. Sho 47-50981*. 3p., Dec. 21, 1972. (Appl. Dec. 26, 1970, 1 claim).

Nitrogen oxides can be removed from waste gases such as automotive exhaust at low temperatures in the presence of oxides of copper, chromium, manganese, iron, cobalt, or nickel together with carbon. A catalyst was designed to remove

CONTROL METHODS

26912

nitrogen oxides, especially nitric oxide. The carbon can be coke, active carbon, coal, or charcoal. The metal oxides that will be carried by or mixed with the carbon do not have to be prepared as such in advance, but instead, a metal salt or hydroxide can be used if it can easily decompose to the oxide. Such metal salts include nitrates, carbonates, and acetates. Copper, chromium, manganese, iron, cobalt, and nickel nitrates are representative nitrates. The metal oxide quantity is in the range of 0.1-20 wt% of the carbon in terms of the metal.

26906

APTIC NO. 48620

Endo, Akira, Tetsu Takeyama, and Keizo Masuda

METHOD OF NITROGEN OXIDES REMOVAL. (San-kachisso no jokyoho). Text in Japanese. (Toray Industries Inc., Tokyo (Japan)) Japan. Pat. Sho 47-50982. 3p., Dec. 21, 1972. (Appl. Dec. 26, 1970, 1 claim.)

Nitrogen oxides can be removed and reduced to nitrogen in the presence of an alkali metal oxide or alkaline earth metal oxide together with carbon at a much lower reaction temperature than when treated with carbon alone. Coke, active carbon, coal, or charcoal can be used as the carbon. A catalyst of lithium, sodium, potassium, magnesium, calcium, or barium oxide or a mixture of them can be used to remove NOx, especially nitric oxide and nitrogen dioxide from waste gases. The catalyst carried by or mixed with carbon does not have to be readied in advance, but instead, a hydroxide of the alkali metal or alkaline earth metal can be used if it easily decomposes to the oxide during the reaction with NOx. The ratio of the alkali metal or alkaline earth metal oxide to the carbon is in the range of 1-10 wt% in terms of the metal quantity. The reaction temperature range of the catalyst is 100-650 C.

26907

APTIC NO. 48799

Falkenberry, H. L., A. V. Slack, and F. E. Gartrell

CONTROL OF FOSSIL FUEL POWER PLANT STACK GAS EFFLUENTS. *Combustion*, 44(4):9-16, Oct. 1972. 9 refs. (Presented at the American Power Conference, Chicago, Ill., April 20, 1972.)

Stringent new emission standards and regulations for fossil-fueled power plants are, in many cases, unrealistic with regard to available technology and time schedules required for compliance. The application of engineering technology to meet most of the new particulate standards will be difficult and expensive. Results from commercial operation of electrostatic precipitators have been far from successful, and some form of preprocessing of high-ash coals may be required to limit ash content. Development of control equipment for very fine particulates will depend on accurate measurement methods. Engineering technology for sulfur dioxide control that does not violate other environmental standards has not been demonstrated in any process--throwaway or recovery. Smelters can produce marketable sulfuric acid more easily than power plants. The only product suitable for recovery in the quantities that would be produced by the electric power industry is elemental sulfur; however, recovery with a realistic by-product credit may be more costly than throwaway processes. Limestone-based processes are nearest to being proven but a number of problems remain to be solved, including those associated with the total liquid recycle, effluent gas mist eliminator plugging, reheater fouling, and unacceptable particulate emission levels. Technology for removing nitrogen oxides from flue gases is far less developed than that for sulfur oxides. The best approach at present appears to be avoid their formation initially.

26908

APTIC NO. 48579

Farber, Benjamin

ADVANTAGES OF WATER-SOLUBLE COATINGS.

Amer. Paint J. Conv. Daily, 1972:16, Nov. 1, 1972.

The problems associated with the use of water-soluble paints in industrial finishes are being solved. Water is now being

evaluated in spray, dip, and knife applied coatings. Water-soluble paints can meet most air pollution requirements, cut fire risks, and maintain the properties needed as coatings with no additional capital investment for their application and use by finishers.

26909

APTIC NO. 48990

Fife, James A.

ENGINEERING THE CONTROLS OVER STACK AND OTHER EMISSIONS: UPDATING SYSTEMS TO COMPLY WITH NEW STANDARDS. Preprint, 8p., 1972. (Presented at the International Pollution Engineering Congress, Cleveland, Ohio, Dec. 4-6, 1972, Paper 23.)

Three elements of a program to ensure compliance with new emission standards are discussed: problem identification, including source sampling; the economic evaluation of alternative gas cleaning methods; and implementation planning, including selection of a contractor and submission of drawings and specifications to a regulatory agency. Economic considerations include the value of the space occupied by a system its reliability, its first cost as compared with availability of funds, and its amortized first and operating costs. These considerations are illustrated by the example of a 10-year-old municipal incinerator being studied for upgrading to meet an emission standard of 0.10 gr/SCF, 12% carbon dioxide. The costs of wet scrubbers and electrostatic precipitators are compared.

26910

APTIC NO. 48988

Forster, E. J., G. H. Unzelman, and L. E. Stinson

BACKGROUND FOR BALANCING ANTIKNOCKS, HYDROCARBONS, AND OCTANE REQUIREMENTS. *Proc. Am. Petrol. Inst., Div. Refining*, vol. 52:95-115, 1972. 8 refs. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

To establish a basis for limiting antiknocks in gasolines, data on road performances of selected cars powered by leaded and unleaded fuels were correlated. Road octane requirements were compared for cars run exclusively on unleaded fuels with matched pairs run on leaded fuels. The best equation to predict road performance of late-model automatic-transmission cars depended primarily upon motor octane number. Lead antiknock content and hydrocarbon type had significant effects on road performance predictions. The use of a manganese antiknock in low concentrations in unleaded fuels improved road octane in the general order of $(\Delta R + \Delta M)/2$. Unleaded fuel combustion chamber deposits accumulated very slowly, eventually causing much higher car octane number requirements than deposits from leaded fuels. (Author abstract modified)

26911

APTIC NO. 48583

Francisco, H. Lynn

THE ENVIRONMENT--SOLVENT PRODUCER'S VIEW-POINT. *Amer. Paint J. Conv. Daily*, 1972:21, Nov. 1, 1972.

The nationwide adoption of regulations on solvent emissions could result in a shortage of exempt solvents. In deciding whether to increase plant capacity, the solvent producer must consider whether the regulations and prevailing prices limit his ability to obtain a satisfactory return on the capital investment required for new equipment. He must also consider the use that can be made of the equipment if other approaches to air pollution are adopted. Recognizing the need to protect the environment, solvent producers are developing new products and working on water-based or solventless coating systems.

26912

APTIC NO. 48555

Furuhashi, Shoichi

THE STATUS QUO OF COMBUSTION RESEARCH FOR ENGINE EMISSION CONTROL. (Enjin no haiki taisaku

o.nokuteki to shita nensho ni kansuru kenkyu jokyo).
Text in Japanese. *Jidosha Gijutsu (Automobile Eng.)*,
26(9):1066-1076, Sept. 1972.

The efficiency of automotive engines is in conflict with the objectives of decreasing hydrocarbon and carbon monoxide emissions to meet the emission standards set up for the Muskie Act in the U. S. It is also difficult to decrease HC, CO, and nitrogen oxides simultaneously. Although engine exhaust gas recirculation does decrease NOx, it sacrifices engine output, decreases smooth operation, and dirties the engine. It is difficult to prolong the life of catalysis for 50,000 miles, although exhaust can be cleaned by recombustion with the catalyzer action. Lead must be eliminated from gasoline, zinc and other metals added to lubricating oil must be decreased, and less lubricating oil must be used in order to use various engine modifications. Basic research work is discussed.

26913

APTC NO. 48462

Gagliardi, J. C., Carol S. Smith, and E. E. Weaver

EFFECT OF FUEL AND OIL ADDITIVES ON CATALYTIC CONVERTERS. *Proc. Am. Petrol. Inst. Div. Refining*, vol. 52:989-1000, 1972. 5 refs. (Presented at the American Petroleum Inst., Div. of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

The effect of fuel composition and oil additives on noble metal catalytic converters was examined. The catalytic system design, experimental equipment and procedures, and test results are reviewed. The effects of phosphorus, lead, zinc, and sulfur were studied. Lead at levels of 35 and 70 mg/gal was measurably detrimental to the noble metal catalysts. Platinum oxidation catalysts, however, were more sensitive to phosphorus than to lead on the basis of equal weight of poison consumed. Sulfur and zinc were not detrimental to the platinum catalyst, but sulfur was determined a poison for the noble metal nitrogen oxide reducing catalyst. (Author summary modified)

26914

APTC NO. 48613

Garrett, Richard

SOLVENT VAPOUR RECOVERY SYSTEM. *Metal Finishing J. (London)*, 18(212):291-293, Sept. 1972.

A vapor adsorption system that recovers usable solvents from vapor laden air and controls air pollution from degreasing tank operations and other sources of vapor emissions was developed. The range includes 18 standard models, each adaptable to a particular industry. The self-contained system consists of one or more adsorbers, a blower and motor assembly, a dust filter, a water-cooled condenser, a water separator, and manual or automatic controls. Process design and operations, plant layout and installation, and economic aspects are reviewed.

26915

APTC NO. 48838

Gauvin, Bernard

AIR POLLUTION FROM AUTOMOBILES. (*La pollution de l'air par les véhicules automobiles*). Text in French. *Tech. Moderne*, 64(10):13-26, Oct. 1972.

General problems of automotive exhaust and possibilities of exhaust emission control are reviewed. The major exhaust components during idle, acceleration, and deceleration are carbon monoxide, CO plus hydrocarbons, and HC, respectively. Three different emission tests for urban traffic, idle, and crankcase hydrocarbons have been adopted in France. The idle CO emission is required not to exceed 4.5%, and the crankcase emission should not be more than 0.15% of the fuel consumed. The smoke density of diesel exhaust is measured by an opacity measurement during acceleration. Feasible and theoretical possibilities to reduce CO and HC emissions include such measures as the use of lean mixtures in steady operation, improvement of the combustion chamber geometry, ignition timing, electronic fuel injection, and injection of aux-

iliary air. The reduction of nitrogen oxide emissions by applying a rich air/fuel mixture, and two-stage catalytic treatment, one for reducing nitrogen oxides and one for oxidizing CO, represents a costly and thus unfeasible method. Exhaust gas recirculation could also be used to eliminate NOx. Since, however, it is not possible to eliminate exhaust emissions completely by any of the possible improvements adopted, studies of engine types other than internal combustion engines, as well as of new fuels, are of basic importance. Gas turbines, Stirling engines, and electric engines are mentioned.

26916

APTC NO. 48984

Gibson, R. O. and D. J. Vinson

SMOKELESS FLARES INSTALLED AT GASOLINE PLANTS. *Oil Gas J.*, 70(49):75-77, Dec. 4, 1972. (Presented at the American Society of Mechanical Engineers, Petroleum Mechanical and Pressure Vessels and Piping Conference, New Orleans, La., Sept. 17-21, 1972.)

Smokeless ground flares have been installed at two gasoline plants of the Colorado Interstate Gas Co. to control air pollution normally associated with the venting and burning of waste hydrocarbons. In the Bivins plant, waste liquid hydrocarbons are collected and lead into a storage tank for later sale. The vapors from the system go to the smokeless flare which has a burner tip with three pilots. A water spray system is arranged around and beyond the flare burner tip. Waste-water streams including cooling tower water are collected in a quench-water pond and are recycled through the spray system. The Fourway plant's waste-gas system is similar to that for the Bivins plant, but uses steam instead of water injection for smokeless burning in the flare. Each flare burner is sized to burn 155,000 lb/hr of HC; however, the Fourway steam-injection system is sized for burning only up to 35,000 lb/hr smokelessly.

26917

APTC NO. 48825

Haager, Karlheinz

DEVELOPMENT TRENDS IN POWER GENERATION AND THE CONSEQUENCES FOR ECONOMY AND CONSUMER. (*Entwicklungstendenzen in der Elektrizitätswirtschaft und ihre Konsequenzen fuer Wirtschaft und Verbraucher*). Text in German. *Elektrizitätswirtschaft*, 71(25):717-723, 1972. (Presented at the Arbeitstagung der Gewerkschaft OTV, Berlin, West Germany, Sept. 12, 1972.)

After a review of the development of power generation in the 1960s, the development trend until 1985 is discussed. The price for 1 kwh will cost less and less with respect to income, which will increase the trend toward a wider use of electricity. Although electricity is non-polluting at its various consumption places, it is feared that the larger number of power plants will increase air pollution. Limiting the supply of electricity would not help the cause of cleaning up the environment. The waste gases from the power plants should be cleaned instead. The dust from these gases is removed to 99% efficiency by electrostatic precipitators. The problem is the sulfur dioxide emission. Flue gas desulfurization has not progressed far enough yet to be successfully applied in power plants. The only means to reduce the SO₂ at the moment is the use of low-sulfur fuel oils. Since they are not available in abundance, the refineries should turn to desulfurizing heavy fuel oil. Moreover, power will increasingly be generated in nuclear power plants which are known to be non-polluting.

26918

APTC NO. 48853

Hammond, Allen L.

MAGNETOHYDRODYNAMIC POWER: MORE EFFICIENT USE OF COAL. *Science*, 178(4059):386-387, Oct. 27, 1972. 2 refs.

Magnetohydrodynamic generators that convert heat from combustion gases directly into electricity offer one of the best methods of eliminating sulfur oxide and reducing nitrogen

oxide emissions from coal-fired power plants. Power plants incorporating MHD generators would also include pressurized combustion chambers for burning the fuel and heat exchangers for preliminary heating of the air fed to the combustor. Exhaust gases from the generators in full-scale power plants would generate additional electricity with conventional steam turbines. The overall efficiency is projected at 50% as compared with 40% for the best conventional or nuclear power plants. With respect to stack gases, cloth traps or electrostatic precipitators would be used to collect the sulfate and alkali particles; NO_x emissions would decrease if the coal is burned in a fuel-rich mixture at excess air added downstream. Costs, operating variables, and thermal pollution control are also considered.

26919

APTIC NO. 48760

Hanniker, G.

AUTOMATIC CONTROL OF WATER FLOW FOR QUENCHING SINTER HOT RETURN FINES. *Steel Times (London)*, 200(10):721-722, Oct. 1972.

Automatic control of water flow for quenching sinter hot return fines is discussed. Water quenching is desirable to reduce dust emission and to cool the return fines in order to safeguard the conveyor belts carrying them. The principle of relating quench pug mill exhaust stack temperature to quench water flow control was adopted. An automatic temperature and water flow control system and its operation are described. Temperature measuring efficiency of manual and automatic water flow conditions are compared. With automatic control, the quench pug mill exhaust stack emission and the return fines moisture variability were reduced to a minimum.

26920

APTIC NO. 48589

Harnett, C. G.

SOME ASPECTS OF HEAVY OIL PROCESSING. *Proc. Am. Petrol. Inst. Div. Refining*, vol. 52:703-718, 1972. 19 refs. (Presented at the American Petroleum Inst., Div. of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

The problems associated with the purification processing of heavy oils and the applications of the processes are reviewed. The constitution of heavy oils was studied. The most practical process for purification is residue hydrodesulfurization, with limits set by the nature of the feedstock and economics. Possible improvements are outlined. Alternatives to the process include hydrodesulfurization of vacuum distillate and reblending with vacuum residue, modified destructive processing, the flexicoking process, partial oxidation processes, and substitute natural gas production.

26921

APTIC NO. 48930

Haysom, D. W. R.

REHABILITATION OF THE SYDNEY STEEL CORPORATION. *Can. Mining Met. Bull. (Montreal)*, 104-109, Oct. 1972. (Presented at the Mining Society of Nova Scotia, Annual Meeting, 85th, Ingonish Beach, June 1972.)

A program to rehabilitate a Nova Scotia steelworks included installation of Maxhutte tuyeres for submerged oxygen injection in blast furnaces; replacement of an ingot mould stripping system with two continuous casting machines; and adoption of a vacuum degassing process for hydrogen reduction. The new oxygen injection system has more than quadrupled blast furnace production, while significantly reducing operating costs. The vacuum degassing and continuous casting systems enable the plant to produce high quality rail steels and to meet the increasing demand for larger and better quality steel plate for pipeline production. A gas cleaning plant consisting of an orifice washer and electrostatic precipitators was built to eliminate gas discharges from the blast furnaces. The plant is expected to solve the problem of iron oxide emissions from the furnaces. High rates of sulfur and phosphorus removal will

be effected by lime injection through the tuyeres. Work will commence shortly on clarification ponds and associated equipment for treatment of mill water, which will be reused in the mills. The scale will be removed and returned to the blast furnace for use in a sinter plant.

26922

APTIC NO. 48813

Heitland, H. and W. Bernhardt

POSSIBILITIES FOR REDUCING THE OXIDES OF NITROGEN FORMATION IN OTTO ENGINES PARTICULARLY BY DIVIDED COMBUSTION AND CATALYTIC CONVERSION. (*Moeglichkeiten zur Verminderung der Stickoxidbildung in Ottomotoren, insbesondere durch Schichtladungsbetrieb und katalytische Konvertierung*). Text in German. Preprint, Federation Internationale des Societes d'Ingenieurs des Techniques de l'Automobile, Brussels (Belgium), 12p., 1972. (Presented at the Federation Internationale des Societes Ingenieurs des Techniques de l'Automobile, International Congress, 14th, London, England, June 26, 1972.)

Based on the findings from theoretical models for nitrogen oxides formation, a CLR single-cylinder engine was used for testing a divided combustion process which seemed to produce low concentrations of hydrocarbons, carbon monoxide, and oxides of nitrogen. With this divided combustion process, a nearly stoichiometric or rich mixture is first ignited and burned. The combustion chamber is constructed so that the flame front progresses into the main combustion chamber after passing the preliminary combustion chamber. In the main combustion chamber a mixture is present with relatively low temperature through which the hot combustion gases are quickly cooled to a lower temperature. Despite an oxygen surplus, only a low NO quantity is formed. The temperature, however, is high enough for rapid oxidizing of the carbon monoxide and the hydrocarbons. The ratio of the preliminary combustion chamber volume to the volume of the main combustion chamber for experimental combustion to measure the pollutant concentrations was 1 to 10 and 3 to 10. At an air/fuel ratio of lambda 2 to 3, the NO_x concentration was measured to be 60 ppm, the CO concentration 0.1% by volume. The hydrocarbon emission was extremely high, so that afterburning became necessary. Another method of removing the NO_x is that of catalytic conversion in a reducing atmosphere. The oxygen bound to the NO_x is liberated on the catalyst surface and used for oxidation of primarily CO and light HC. If these processes are to take place, the fraction of free oxygen in the waste gas must be smaller than that required for a complete oxidation of the carbon monoxide present in the waste gas. The NO_x catalysts, which are usually made of non-precious metal oxides, require lead- and sulfur-free gasolines for a good activity.

26923

APTIC NO. 48485

Hildebrandt, Eberhard

ELECTRIC POWER PRODUCTION AND THE PLANNING OF A SOCIALIST STATE CULTURE IN THE DISTRICT OF COTTBUS. (*Elektroenergieerzeugung und die planmaessige Gestaltung einer sozialistischen Landeskultur im Bezirk Cottbus*). Text in German. *Energietechnik*, 22(12):563-567, 1972. (Presented at the Luftthygenischen Kolloquium der Brennstofftechnischen Gesellschaft, 4th, Cottbus, East Germany, 1972.)

The German Democratic Republic plans to raise its power production in 1975 to 88 or 90 billion kWh. Despite the advance of nuclear power, most of the power will continue to be produced by conventional combustion processes, which means that the oxides of carbon, sulfur, nitrogen plus hydrocarbons and dust will be emitted into the atmosphere in higher quantities. A 3000 MW power plant operated with soft coal, for example, emits 20,000 t/yr of dust, 200,000 t/yr of SO₂, and 40 million t/yr of carbon dioxide. Furthermore, a power plant of this size produces 2 million t/yr of ash. A detailed plan to curb these emissions and production of solid waste products was

worked out. It comprises the extensive overhauling of dust collectors in newer and older power plants. The latter are planned to be taken out of operation by 1980. Over the next years, \$5 million will be appropriated for the renovation of dust collection systems. The ultimate aim is to reduce the dust concentration to a residual 0.1 mg/cu m at the CO₂ concentration of 13% and an availability of the electrostatic precipitator of 95%. Since no suitable flue gas desulfurization method is yet available, the SO₂ emissions are discharged by stacks rising to a height of about 300 m. During inversion conditions, the addition of ammonia to the stack flow is planned for reducing the SO₂ emission. Research has been initiated to find a method of reusing the mass of fly ash from coal-fired power plants.

26924 APTIC NO. 48665

Hirano, Asasaburo, Sadaharu Tanaka, and Yoshihiro Nabeshima

A MOVING-TYPE DUST COLLECTOR FOR A METAL MIXER. (*Konsenro ni okeru idoshiki shujinki*). Text in Japanese. (Kawasaki Steel Corp., Kobe (Japan)) Japan. Pat. Sho 47-49961. Jp., Dec. 15, 1972. (Appl. Feb. 21, 1969, 1 claim).

A moving-type dust collector was designed for collecting hot dust containing graphite and iron oxide generated when molten metal is taken into ladle or pot for a metal mixer. One unit of this collector takes care of two metal mixers. The collector is composed of a hood-like structure mounted on a platform structure. When the hood is moved to the extreme right end of the guide rail, the hole in the right half of the hood comes directly under the iron spout of the right metal mixer so that the molten metal or iron may be poured through the hole into the ladle placed under the hole. When moved left, the molten iron may be poured through a left hole in the structure into the left ladle in a similar manner. Right and left ducts are connected to a blower fan which blows air to form an air curtain. Since almost all of the dust is generated when the molten iron gets into the ladle, the air curtain prevents dispersion of dust. The dust is then sucked into the stationary duct through the hood and a short duct and is collected.

26925 APTIC NO. 48668

Hunter, William D., Jr. and James P. Wright

SO₂ CONVERTED TO SULFUR IN STACKGAS CLEANUP ROUTE. *Chem. Eng.* 1972:50-51, Oct. 2, 1972.

Most processes for control of sulfur dioxide emissions involve production of by-product sulfuric acid or neutralization of SO₂ to yield waste material. A third alternative is direct, catalytic reduction of SO₂ to elemental sulfur using natural gas as the reductant. Conversion efficiency of this process is 90% or better. As adapted by a Canadian metallurgical plant, the process consists of three main sections: gas purification, SO₂ reduction, and sulfur recovery. The purification system is similar to that in sulfuric acid plants using metallurgical SO₂ gas sources. In the reduction section, nearly half the SO₂ is converted to elemental sulfur by reaction with methane, along with simultaneous formation of hydrogen sulfide. The reduction system consists of two packed-bed regenerators and a catalyst-packed reactor. The heat regenerators remove heat from the gases leaving the reactor and use this heat to preheat gases entering the reactor. In the sulfur recovery section, sulfur formed in the reduction system is condensed out of the gas, and the remaining SO₂ and H₂S are reacted in a multistage Claus conversion system to produce additional sulfur.

26926 APTIC NO. 48666

Isawa, Rinichiro and Kimio Horiuchi

JOINT TREATMENT METHOD OF SEWAGE, CONTAMINATED AIR, AND OTHERS. (*Gesui, osen kuki sonota no kyodo shori hoho ni tsuite no ichikosatsu*). Text

AIR POLLUTION ABSTRACTS, MAY 1973

in Japanese. *Mizu Shori Gijutsu (Water Purif. Liq. Wastes Treat.)*, 13(12):1-7, Dec. 1972, 8 refs.

When the polluted air from factories is led into a sewage system for treatment, the treatment time for sewage is shortened and more sewage can be treated. Combined methods of treatment are more effective in treating various kinds of pollutants. If sewage mixed with polluted air is given biological treatment, some of the pollutants are eliminated, so that the task of terminal treatment is made easier. Warm waste air or heat released from air conditioning increase the temperature of the sewage which gives better sewage treatment. Although the maintenance cost increases, energy is saved. It is easier to treat polluted air by joint treatment, since part of the pollution is eliminated with the sewage. Scattering of air pollutants can be prevented, instead they can be treated in a concentrated form. Computers can be used for air and water control. The combined treatment is discussed for activated sludge, aeration, final treatment, and tertiary treatment.

26927 APTIC NO. 48822

Ishibashi, Kazuharu

NITROGEN OXIDES CONTROL MEASURES AND DESULFURIZATION OF BOILER STACK GAS. (*Boira haigasu no NOx taisaku to haiendatsuryu*). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Kansai Branch, p. 47-55, 1972. (Presented at the Japan Society of Mechanical Engineers, Kansai Branch, Lecture Meeting, 17th, Osaka, Japan, Dec. 5-6, 1972.)

Dry- and wet-type stack gas desulfurization processes employed by power plants in Japan are outlined. Two stack gas desulfurization systems installed in the Sakai Power Plant and the Amagasaki Higashi Power Plant of the Kansai Electric Power Co. are discussed. The Sakai System is an active carbon process mainly consisting of the adsorption, desorption and sulfuric acid manufacturing. It handles about 175,000 N cu m/hr of the stack gas, giving a sulfur dioxide concentration of about 400 ppm at the entrance. The desulfurization efficiency is about 90%, producing about 330 tons of 98% concentration sulfuric acid as a by-product. Total pressure loss is about 125 mm Aq. Some parts of the temperature adjuster, adsorber, and desorber become corroded during use, so actions were taken to avoid the corrosion. The Amagasaki Higashi System is the lime-gypsum process in which SO₂ is absorbed by an emulsion of quick lime to obtain gypsum as the by product. It comprises three desulfurization processes including exhaust gas cooling, absorption, and re-heating, and two more for oxidation of the product and separation/recovery of the same. It handles about 100,000 N cu m/hr with about 90% desulfurization efficiency. The gypsum produced as the by-product has a purity of 98% and amounts to about 1100 tons. The problems experienced with operation of this system include abrasion and deposition of scales. The corrective measures for these troubles are listed. Measures to reduce nitrogen oxides content of the stack gas include low excess air combustion, recirculation of the gas for mixing, and two-stage combustion.

26928 APTIC NO. 48607

Jonakin, J. and A. L. Plumley

CONTROL OF STACK GAS EMISSIONS FROM STEAM GENERATORS. *Proc. Am. Petrol. Inst. Div. Refining*, vol. 52:247-266, 1972, 19 refs. (Presented at the Midyear Meeting, 37th, New York, May 8-11, 1972.)

Control methods developed to reduce sulfur oxides emissions from oil-fired steam generating units are reviewed. The various techniques include the use of low-sulfur fuels, fuel desulfurization through hydrosulfurization, water scrubbing of the flue gas, limestone additive processes, wet absorption, and alkaline additive injection. The operation of a tail-end lime/limestone wet scrubbing system is described.

26929

APTIC NO. 48482

Kanbe, Ryuzo

PERFORMANCE AND PROBLEMS OF A CATALYTIC FILTER. (*Shokubai firuta no seino to mondaiten*). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(6): 27-35, Dec. 1972. 6 refs.

Catalysts used for removal of gases are generally oxidized iron, copper, zinc, nickel, chromium, manganese, cobalt, vanadium, silver, or palladium. The industrial catalyst is chiefly manganese dioxide mixed with a few auxiliary catalysts. In the contact reaction of a gas with a catalyst, oxygen from the air adsorbed to the surface of the catalyst is combined with other gases at the point of activation to produce an oxide; as the boiling point of the gas becomes higher, the hydrophilicity increases. Hydrocarbon and halogenated hydrocarbons are decomposed, through oxidation, to a few simple compounds such as water, carbon dioxide, and hydrogen chloride which are then easy to adsorb or absorb. For example, sulfur dioxide is very hard to adsorb even with active carbon and has a low water solubility. However, it can be adsorbed more easily by active carbon and its water solubility increases to permit easier neutralization with an alkaline solution when oxidized to sulfur trioxide. The manganese dioxide catalyst gives a slower oxidation reaction when it contains water. The water content of this catalyst should be kept below 1% for efficient removal of carbon monoxide from a gas. A catalyst made of a precious metal is reviewed in terms of its cost versus performance. Also discussed are various aspects of catalytic air filters including the structural design, pressure loss, and replacement of the filter element. Several types of air filters available are also introduced.

26930

APTIC NO. 48529

Kent, George R.

MAKE PROFIT FROM FLARES. *Hydrocarbon Process.*, 51(10):121-123, Oct. 1972. 3 refs.

A 550 million lb/yr ethylene unit was used to develop an economic comparison of three alternative flare systems. In the first system, a storage sphere is inserted into the flare system with a compressor capable of recycling the gas, at double leakage rate, back to the process. The recycled gas can be fed into the fuel gas header or can be reprocessed in the plant as a side stream feed. Storage sphere volume is based on 1/2 of the maximum discharge at a semi-parabolic rate. The refrigerant system can contain its material at settling out pressure. The second alternative uses multiple low-pressure storage and recycle spheres. In the third alternative, a compressor boosts the low pressure gas from the sphere into high pressure tanks and the gas is fed back to the plant through a depressuring station. The flare scheme represented by the first alternative indicates a potential savings of more than \$4 million over the life of the plant.

26931

APTIC NO. 48522

Kimura, Norio, Zenya Hasegawa, and Toshiki Akamatsu

DUST COLLECTION CHARACTERISTICS OF COLLECTRON. (*Korekutoron no shujin seino*.) Text in Japanese. Funtai Kogaku Kenkyu Kaishi (J. Res. Assoc. Powder Technol., Japan), 9(6):392-398, Nov. 1972. 8 refs.

The collectron, an improved general cyclone, with a tangential inlet is discussed. The efficiency of the particle collection mechanism and optimum operating conditions were studied. Flow patterns were measured by a three-dimensional pitot tube. The data indicated that the tangential velocity was increased by a secondary recirculation of air, but that there was little increase in axial and radius velocity components. Collection efficiency was improved by the primary separation mechanism with a greater centrifugal force and secondary air recirculation. The cut size of the particles became smaller with an increase of secondary air.

26932

APTIC NO. 48977

Kubyshev, N. N., N. S. Krotov, and R. V. Meysner

PRODUCTION OF SULFURIC ACID IN LEAD FACTORIES. (*Proizvodstvo sernoy kisloty na svintsovykh zavodakh*). Text in Russian. Tsvetn. Metal., no. 10:22-25, Oct. 1972. 2 refs.

A process for the production of sulfuric acid from agglomeration waste gases rich in sulfur dioxide at a lead processing factory is described. To obtain a waste gas with the highest possible SO₂ concentration, the particle size of the flux and agglomerate have been chosen to be 6 and 8 mm, respectively. While waste gases with low SO₂ concentrations (1-1.5%) are cooled from 450-550 C to 180 C and sent to bag filters and returned into the process, the SO₂-rich gases are cooled from 200-250 C to 100 C for subsequent purification operations in dry a electrostatic precipitator, scrubber, two-stage wet type electrostatic precipitator, and a two-stage drying tower. The dried gas contains up to 0.01% water, 0.005 g H₂SO₄ vapor/cu m, and no arsenic. Sulfuric acid is obtained in a four-layer contact apparatus. Sulfur trioxide is absorbed in two series of absorbers by oleum monohydrate. The possibility of substituting oleum with monohydrate is being studied. With an agglomerate sulfur utilization rate of 70-72%, the efficiency of the sulfur-to-H₂SO₄ conversion is 90-91%.

26933

APTIC NO. 48792

Kuribayashi, Akira

POLLUTION CONTROL MEASURES AT THERMAL POWER STATIONS. (*Karyoku hatsuden-sho ni okeru kogai taisaku ni tsuite*). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, p. 65-76, 1972. (Presented at the Seminar on Recent Technology of Public Pollution Control, 370th, Fukuoka, Japan, Dec. 11-12, 1972.)

The Kyushu Power Co., Inc., is attempting to meet pollution regulations for emissions due to thermal electric power generation. The average sulfur content of the principal fuels being used by the company has decreased annually from 2.3% in 1969 to 2.0% in 1970, and to 1.7% in 1971. But acquisition of low sulfur heavy oil will become more difficult, since the total annual fuel consumption of the company will expand from approximately 3,400,000 kl in 1971 to 5,400,00 kl in 1976. Plain thermal processing of crude petroleum oils, desulfurization of waste gas, adjusting the sulfur content of the fuel by installing low sulfur fuel blenders, introducing liquefied natural gas or naphtha, or installing centralized stacks (300-400 m in effective functional height), are possible solutions to the pollution problem. The mechanisms and reaction equilibria of nitrogen oxide formation show that the formation reaction promotes rapidly as the reaction temperature exceeds 1500 C and oxygen concentration increases. So, nitrogen oxide formation can be largely curbed by properly reducing combustion temperature and oxygen concentration as required. Otherwise, recirculation of combustion gas and two stepwise air supply operation are effective for NO_x control. Double step combustion, mixing of inert waste gas into the air supply for combustion, mechanical dust collectors, and electrostatic precipitators are other control methods. Dust collectors are applied to coarse dusts of more than 10 micron in diameter; electrostatic precipitators are for smaller particles. A combined electrostatic precipitator/mechanical collector catches more than 95% of the dusts with coal as fuel. The precipitator settles more than 80% in the case of heavy oil. In an emergency, the company switches to a fuel supply of less than half the sulfur content for 30 minutes. The daily waste water from power stations is small in total quantity. But, the waste water to be temporarily discharged amounts to only 500-2000 cu m/time discharge. Analysis results indicated pH of 6.5-8.3 s/s 10 ppm, COD of 10 ppm, and oil content of 5 ppm max etc. The company has set up a target for noise level 50-55 phons at night times. Fish and shellfish breeding experiments by utilizing hot waste water are also under way.

26934

APTIC NO. 48940

Kurz, G.

THERMAL METHODS FOR ENVIRONMENTAL PROTECTION. (*Thermische Verfahren des Umweltschutzes*). Text in German. *Chem. Rundschau* (Solothurn), 25(49):1681-1683, 1972.

The use of immersion burners for waste water treatment, the catalytic and thermal cleaning of waste air or waste gases, and combustion facilities for the disposal of liquid or gaseous organic waste material are described. Among other things, immersion burners can be used for neutralizing waste water. The waste gases from the combustion at the burner are spread among the waste water. Costs can be saved if the flue gases of an existing boiler furnace can be used. An evaluation of thermal versus catalytic afterburning of waste air shows that the latter method is much more efficient for the reduction of the oxides of nitrogen. They can be reduced to a few ppm, while a thermal reduction would still leave 2000 ppm in the waste air from originally 20% by volume.

26935

APTIC NO. 48767

La Mantia, Charles R.

SO₂ CONTROL FOR INDUSTRIAL BOILERS. *Natl. Eng.*, 76(11):12-14, Nov. 1972. (Presented at the Industrial Coal Conference, Lafayette, Ind., Oct. 5, 1972.)

Relatively little attention has been paid to the development of sulfur dioxide control technology for industrial scale boilers burning high sulfur fuel. The annual total emissions from these small boilers correspond to about 20% of the total emissions from power plant operations; however, the SO₂ generally is released from lower stacks, which can cause a higher contribution to the ground level SO₂ concentration. To comply with government emission codes, the plant must either substitute a low sulfur fuel or install SO₂ control equipment. The choice is necessarily based on local emission requirements, local fuel costs, market availability, and the cost, state of development, and reliability of the applicable control processes.

26936

APTIC NO. 48887

Langford, M. J.

MICROBIAL ACTIVATION OF CATALYSTS. *J. Appl. Chem. Biotechnol.*, 22(9):1027-1039, Sept. 1972.

Attempts were made to regenerate supported metal catalysts through the use of sulfate-reducing bacteria and to activate hydrogenation catalysts by microbial decomposition of metal salts impregnated on a catalyst support. Sulfate reductions of 90-97% were achieved with fouled bauxite catalysts used for hydrogen sulfide oxidation. The original activities and surface areas were recovered in each case, and the alumina content of the catalyst was restored at least to its original value. In the case of supported metal reforming catalysts, about half the sulfate was removed by the microbial regeneration technique. Microbially treated nickel catalysts on Kieselguhr or silica supports were tested for degree of activity in the hydrogenation of fatty acids, hydrogenation of glucose or pyridine, and hydrogenation of a long chain fatty nitrile to the corresponding primary amine and subsequent rearrangement to the secondary amine. The order of activity corresponded with nickel crystallite size and was highest for Kieselguhr-supported samples. Carbon monoxide chemisorption experiments indicated that microbial treatment increased metal surface area and also the dispersion of metal crystallites over the support surface.

26937

APTIC NO. 48902

Leonard, Milton H.

CARBON BLACK-MEETING TODAY'S CHALLENGE. *Am. Paint J. Conv. Dly.*, 1972:18, Nov. 1, 1972.

The carbon black industry discontinued the production of low and medium color channel blacks in 1972 due to government regulations. By this time furnace blacks with satisfactory color, tone, and dispersion characteristics were available.

However, coating manufacturers had to reformulate to adjust for differences in physical properties of channel and furnace blacks. In addition, manufacturers of resinous and polymeric coatings for food applications, who are required by the Food and Drug Administration to use channel black, had to reformulate to the higher color channel blacks still available. By using furnace blacks, the coating manufacturer has realized savings of 15%.

26938

APTIC NO. 48922

Levine, D. G. and E. J. Longosz

FUTURE GASOLINE QUALITY. *Automotive Eng.*, 80(11):17-21, Nov. 1972. 12 refs. (Presented at the Princeton University Conference, 1972.)

The effects of federal regulations on gasoline quality with respect to engine performance, emission standards, and conservation of petroleum resources are discussed. Octane requirements, hydrocarbon composition of unleaded gasolines, gasoline volatility, detergent fuel additives, and projected emissions to 1980 of hydrocarbons are reviewed. Control system reduction of benz(a)pyrene emissions are mentioned. The effect of vapor pressure, gasoline compositions, additives, and control devices on hydrocarbons and photochemical reactivity are discussed.

26939

APTIC NO. 48773

Liesegang, Wilhelm

THE PROTECTION OF SHUTOFF ARMATURES AND REGULATING VALVES AGAINST DAMAGE BY SOLID PARTICLES WITH CYCLONES. (*Sicherung von Absperrarmaturen und Regelventilen vor Beschädigung durch Fremdstoffe mit Zyklonabscheidern*). Text in German. *Arch. Tech. Messen*, (12):231-234, Dec. 1972. 14 refs.

Cyclones have been in use in the industry for decades. They gain increasing importance for the dust collection in gas distribution networks and for the cleaning of waste gases from the production processes of the chemical industry, cement works, power plants, and metallurgical plants. The basic design of a cyclone is illustrated and the determinations of the collection efficiency and the pressure loss are briefly reviewed. Collection efficiency and pressure loss depend largely on the design, dimensions, and gas entrance velocities. The use of a cyclone for the protection of shutoff armatures and regulation valves in the converter feed-pipe of a steel plant is discussed.

26940

APTIC NO. 48854

Lorenzi, L., Jr., J. S. Land, L. J. Van Nice, E. P. Koutsoukos, and R. A. Meyers

TRW ZEROES IN ON LEACHING METHOD TO DESULFURIZE PYRITE COALS. *Coal Age*, 77(11):76-79, Nov. 1972. 4 refs.

The Meyers process for removal of inorganic (pyritic) sulfur from coal is described. The process involves contacting the iron pyrite in the coal with an aqueous ferric sulfate solution and oxidizing the pyritic sulfur to elemental sulfur. The free sulfur can then be removed from the coal matrix by solvent extraction or various other processing methods (e.g., by air oxidation) and recycled. Laboratory and bench-scale experience with the process, including leaching, regeneration of the leach solution, coal washing with water, and solvent extraction and coal drying, is reviewed. The process should increase the quantities of Appalachian, Pennsylvania, and Maryland coal capable of meeting the Environmental Protection Agency's sulfur dioxide emission standard of 1.2 lb SO₂/million Btu of input energy. Estimated overall processing cost for the process is \$1.95/ton of coal (8 cents/million Btu); capital cost for a 250 mw plant is estimated at \$4 million. A pilot plant is scheduled to begin operation in mid-1974.

CONTROL METHODS

26941

APTIC NO. 48663

Ma, Yi Hua and Claude Mancel

DIFFUSION STUDIES OF CO₂, NO, NO₂ AND SO₂ ON MOLECULAR SIEVE ZEOLITES BY GAS CHROMATOGRAPHY. *Am. Inst. Chem. Engrs. J.*, 18(6):1148-1153, Nov. 1972. 18 refs.

Gas chromatography was used to measure the diffusion coefficients and the isosteric heats of adsorption of carbon dioxide, nitric oxide, nitrogen dioxide, and sulfur dioxide on 5A and 13X molecular sieves, natural mordenites, and synthetic sodium and hydrogen mordenites in the temperature range of 133-325 C. Diffusional resistances for all gases studied decreased in the following order: natural mordenites greater than Na-mordenites greater than H-mordenites greater than molecular sieves. This indicated the increased ease of flow in the three-dimensional network. Isosteric heats of adsorption (3-12 kcal/mole) and activation energies (3-19 kcal/mole) decreased in the same order. The variations of diffusion coefficients, heats of adsorption, and activation energies are discussed in terms of the interaction between the surface and gas molecules as well as the openings of the pores relative to the size of the diffusing molecules. An understanding of the diffusional mechanisms and the determination of the effective diffusion coefficients in zeolites are essential for their application to catalysis and adsorption. (Author abstract modified)

26942

APTIC NO. 48740

Maehara, Shigeru and Fumio Kodama

CONTROL METHOD FOR DISPOSAL OF WASTE GAS FROM AN OXYGEN UP-BLOWING CONVERTER. (Sanso uwabuki tenro no haigasu shori sogyoho). Text in Japanese. (Nippon Steel Corp., Tokyo (Japan)) Japan. Pat. Sho 47-49402. 4p., Dec. 12, 1972. (Appl. Jan. 16, 1968, 1 claim).

The cooling unit of a conventional waste gas combustion system for oxygen up-blowing converters is designed to withstand the peak load of heat produced from the calorific value of the waste gas (sensitive heat plus combustion heat of carbon monoxide in the gas). Therefore, it is very large to stand the peak heat load. While it is utilized at full capacity at times of peak waste gas emission, it is not required to perform at full capacity at other times, such as the early or last stages of the smelting process. A new disposal system was designed with a much smaller cooling unit which has the same efficiency as the larger cooling units because of a gas control system. When the thermal characteristics exceed the predetermined values, the opening between the cooling system and the furnace top is automatically narrowed with a moving hood. When the opening has to be narrowed, air cannot enter through the opening by controlling the pressure at the entrance of the cooling system. This prevents the combustion of CO. When the thermal characteristics drop below the predetermined values, the opening is increased. When the opening is increased, the entrance pressure is no longer controlled, so that more air can be admitted to burn CO. This causes a constant heat load, and thus a comparatively smaller cooling unit is needed.

26943

APTIC NO. 48468

Manley, L. W.

FUEL REQUIREMENTS OF THE ROTARY ENGINE. *Proc. Am. Petrol. Inst. Div. Refining*, vol. 52:954-962, 1972. (Presented at the American Petroleum Inst., Div. of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

Data was compiled on rotary combustion engine performance to determine the antiknock gasoline requirements. Fuel and oil consumption, octane number requirement, leaded and unleaded fuels, and exhaust emissions were also examined. The engines had relatively low antiknock requirements, ranging within 78-88 for octane number requirement values. Emissions of hydrocarbons exceeded emission standards at times, but

nitrogen oxide and carbon monoxide emissions were well within the limits.

26944

APTIC NO. 48765

Mann, E. L.

SO₂-ABATEMENT SYSTEM BUILDS ON SUCCESS.

Elec. World., 178(9): 70-72, Nov. 1, 1972.

Two commercially proven sulfur dioxide recovery processes will be combined in a demonstration power plant to test the economic feasibility of sulfur recovery. The SO₂ will be removed from the flue gas by the Wellman-Lord process which will in turn deliver the concentrated SO₂ to a reduction facility operating on two stages: primary catalytic reaction of SO₂ with natural gas to produce sulfur and hydrogen sulfide and a secondary Claus conversion system. Plant construction, operations, and costs are reviewed.

26945

APTIC NO. 48469

Matula, J. P., H. N. Weinberg, and W. Weissman

FLEXICOKING: AN ADVANCED FLUID COKING PROCESS. *Proc. Am. Petrol. Inst. Div. Refining*, vol. 52:665-681, 1972. (Presented at the American Petroleum Inst., Div. of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

Flexicoking is a residuum conversion process that integrates coke gasification with conventional fluid coking, producing high yields of clean, light petroleum products from relatively poor quality crudes, while complying with strict air and water pollution regulations. About 95% of the total sulfur in the residuum can be recovered from the fuel product. Pertinent background data on the process, operating variables, and applications are reviewed. (Author abstract modified)

26946

APTIC NO. 48933

McLeish, George

CARIBOO PLEASES ECOLOGISTS AND ECONOMISTS. *Pulp Paper Mag. Can. (Quebec)*, 73(10):42-44, 46, 51-52, Oct. 1972.

A new bleached kraft mill in British Columbia has assumed responsibility for disposal of wastes from 16 area sawmills, which annually burn nearly 275,000 bd units of bark and other waste in smoke-emitting beehive furnaces. Up to 250,000 bd units of waste will be burned at the kraft mill in a low-particulate emission hog-fuel fired boiler with a travelling grate. The remaining hog will be trucked to a special landfill area. As a first step in odor control, the evaporator train at the pulp mill features a concentrator instead of a cascade evaporator. In addition, the recovery boiler eliminates direct contact between furnace gases and black liquor, all but preventing the escape of malodorous compounds to the atmosphere. The residual malodorous gases from the turpentine recovery and odor abatement unit are incinerated in gas-fired lime kilns. Bleach and recausticizing plant effluents will be retained for 2 days in a primary aerated lagoon; the remaining mill effluent will be treated in a clarifier, then combined with treated primary basin effluent and passed to a secondary lagoon that is also equipped with aerators. After 3.4 days retention, the combined effluent will be discharged to a river. Sludge from the clarifier underflow will be filtered and dewatered before removal to a landfill.

26947

APTIC NO. 48599

Meakin, John C.

GLASS-FIBRE PAPERS: A NEW TYPE OF FILTER.

Chem. Brit., 8(5):213-215, May 1972.

A new type of filter, made from glass fibers instead of cellulose, is discussed. The characteristics of glass fibers and the filtration characteristics of glass-fiber papers are described. The relative merits of glass fiber paper, other fibrous filters, filters of sintered materials, and membrane filters are com-

pared. Glass-fiber paper combines effective retention of small particles with a rapid flow rate and high load capacity; it is also chemically and thermally resistant. The efficiency of glass-fiber papers with respect to dust collection in gas filtration and suspended particles in liquid filtration is reviewed. The cost of the new filter is considered in relation to that of other filters.

26948

APTIC NO. 48465

Meguerian, G. H., F. W. Rakowsky, E. H. Hirschberg, C. R. Lang, and D. N. Schock

NOX REDUCTION CATALYSTS FOR VEHICLE EMISSION CONTROL. *Proc. Am. Petrol. Inst. Div. Refining*, vol. 52:740-760, 1972. 9 refs. (Presented at the American Petroleum Inst., Div. of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

The properties of nickel oxide catalysts on pelleted, monolithic ceramic, and metallic supports and the engineering requirements for their effective use as nitrogen oxide catalysts for automotive emission control were investigated. The pelleted promoted nickel oxide catalysts exhibited very high activity at temperatures as low as 700 F at mildly reducing conditions (0.8-1.5%), minimized ammonia formation, and resisted mechanical and thermocycling attrition. However, they were very sensitive to thermal degradation at temperatures above 1400 F and, with prolonged use, even degraded at 1300 F. Metallic and monolithic catalysts, ineffective at temperatures below 1000 F, were very active at higher temperatures where ammonia formation and deactivation by sulfur are not troublesome. (Author summary modified)

26949

APTIC NO. 48758

Michaelis, Theodore B.

HOW TO MINIMIZE GRAVURE AIR-POLLUTION CONTROL COSTS. *Inland Printer/Am. Lithogr.*, 169(6):54-55, Sept. 1972

To reduce solvents emitted during gravure printing, it is first necessary to reduce the effluent air to the minimum. Air can be recirculated until the solvent concentrations are built up to maximum permitted levels. Once the flow of vapor-laden air is reduced, the selection of emission control equipment will be based upon economic considerations. The initial capital cost of incineration equipment is lower than that of adsorption equipment, but the operating cost is relatively high. Incinerators can remove 90-95% of all hydrocarbons. The cost for gas to fuel the incinerator may be quite high, so heat exchangers are often used. A solvent vapor recovery system can often pay for itself in less than three years, before taxes.

26950

APTIC NO. 48880

Mikhaylov, N. F., V. M. Metropolskaya, Z. S. Goncharova, A. A. Popov, L. P. Kolomyets, and V. G. Balanov

A CONTRIBUTION TO THE PURIFICATION OF COKE GAS FUEL PROBLEM. (K voprosu ob ob ochistke otopylnogo koksovogo gaza). Text in Russian. *Koks i Khim.*, no. 11:32-34, 1972. 6 refs.

Problems of coke gas purification as a means of avoiding buildups in furnaces were studied. Buildup formation may be due to saturated vapors of various compounds, condensing at low temperature, to suspended particles and to components capable of engaging in chemical reactions. The use of an electrostatic precipitator with 50-60% efficiency for coke gas purification following hydrogen sulfide removal resulted in the formation of dark brown buildup in the furnace, which was composed of 20.76% carbon, 1.44% hydrogen, 5.33% oxygen, 2.4% nitrogen, and 46.73% sulfur. The latter contained 83.5% of elementary sulfur and the rest tarry products. The nitric oxide concentration of the coke gas decreased by 20-55% while passing through the electrostatic precipitator during 1.5-2 sec, and the resulting nitrogen dioxide reacted with cyclopentadiene and other unsaturated hydrocarbons to form tarry

AIR POLLUTION ABSTRACTS, MAY 1973

products which had no time to condensate within the precipitator. The findings indicate that electrostatic precipitators should not be used for the purification of coke gas fuel due to buildup formation in furnaces. Scrubbing in coolers, using 40-50 cu m of recycled water for a gas throughput of 95,000 cu m/hr, has an efficiency of 60%. Even higher efficiencies can be reached by foaming techniques, or by using 4 l of water of 6-8 C/cu m of coke gas.

26951

APTIC NO. 48991

Miller, Leland B.

EASTERN LOCATION, ENVIRONMENTAL CONTROLS MAKE A. E. STALEY PLANT UNIQUE. *Ind. Develop.*, 141(4):3-6, July/Aug. 1972.

Wet corn processing borders more on heavy chemical manufacture than the typical food processing plant. Therefore, the decision to locate a corn refinery in basically residential Morrisville, Pennsylvania, required the utmost attention to preserving and protecting the environment. Particulate emissions from corn feed drying operations are effectively reduced by cyclones and wet scrubbing. Odors are controlled by recycling and incineration. In addition to the scrubbing/incineration system, cyclones and Aerodynes control feed handling emissions throughout the plant. The liquid waste treatment plant employs primary and secondary treatment; in the final treatment basin, six floating aerators purify the wastes during residence times of up to 24 hr. Inside the liquid waste treatment plant, boilers and dryers use low-sulfur oil during winter months and natural gas in warm weather. Noise levels are being reduced by noise-abatement shields and enclosures. The plant manufactures corn sweeteners, starches, and feed stuffs on a 24-hour basis.

26952

APTIC NO. 48516

Mitchell, G. E.

CONTROL OF PARTICULATE EMISSIONS. *Proc. Am. Petrol. Inst. Div. Refining*, vol. 52:536-539, 1972. (Presented at the American Petroleum Inst., Div. of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

Emission control at a refinery is reviewed. Control of particulate emissions is primarily affected with an electrostatic precipitator. The combined flue gases from the catalytic cracking and fluid coking units are processed in the precipitator after combustion in carbon monoxide furnaces. In early operation, emissions frequently exceeded a Ringelmann two opacity and a weight loss of 100 lbs/hr due to unsatisfactory recovery of the cracking catalyst in the precipitator. Significant improvements were effected with process and equipment modifications, and further improvements should reduce the Ringelmann rating to less than one and the weight loss to less than 40 lbs/hr. (Author abstract modified)

26953

APTIC NO. 48818

Miura, Mitsugu

DUST COLLECTOR USING BUBBLES. (Awa o riyosuru shujinsochi). Text in Japanese. (Miura Engineering International Co., Ltd., Osaka (Japan)) *Japan. Pat. Sho* 47-48988. 3p., Dec. 9, 1972. (Appl. Dec. 5, 1969, 1 claim.)

An ordinary wet-type dust collector is highly effective in collecting dust of a few micron or larger diameter, but not as effective when the dust is much smaller, such as 1 micron or 0.1. This is because a fume-like dust particulate of an extremely small size is hard to wet with water or other scrubbing solutions. Dust collecting efficiency of a wet-type dust collector largely depends on this wetting process. To improve wetting of the small particulates, this invention has been made in which bubbles or foams are utilized to achieve the purpose. The dust collector in question comes roughly in a vertical tubular shape. Inside the lower half is the reaction drum with tangential slits; there is an exhaust drum with tangential slits inside the upper half. The exhaust port is provided on the top side of the dust

CONTROL METHODS

26959

collector. The absorbent solution containing a foaming agent is stored in the bottom of the collector. As the dusty gas or air is blown into the collector, it goes into the reaction drum through the slits and ascends turning. Pulled by this ascending/turning force of the gas or air, the absorbent agent moves upward as a thin liquid membrane along the internal wall of the reaction drum. A part of this membrane is atomized by gas or air moving in at a high speed through the slits of the reaction drum and bubbles violently. The bubbles fill the drum and continue ascending, while other parts of the absorbent liquid that have not foamed as yet precipitate to form the liquid membrane, a part of which now bubbles. The bubbles reaching the exhaust drum are extinguished by the defoaming agent injected from above. In the defoaming chamber which is larger in diameter, the ascending velocity of the gas is slower, so that gas/liquid separation is effectively performed. The gas now free of the bubbles moves out of the exhaust particulates are effectively wetted and thus arrested.

26954

APTIC NO. 48546

Morishima, Naomasa, Tetsuo Yoshida, Yasuo Kousaka, and Yoshihiro Nonaka

AN EXAMINATION FOR THE DESIGN OF VENTURI SCRUBBER. (*Benchuri sukuraba no sekkei ni kansuru ichikosatsu*). Text in Japanese. *Funtai Kogaku Kenkyu Kaishi* (J. Res. Assoc. Powder Technol., Japan), 9(6):357-362, Nov. 1972. 10 refs.

The relationship between collection efficiency and pressure drop for the venturi scrubber was calculated by a combined method, based on the washing factor owing to inertia impaction. The pressure drop was calculated from the equation; the friction factor, divergent loss and acceleration loss of atomizing drops in the venturi tube were taken into consideration. For more effective collection efficiency it was suggested that the tube be made longer at the throat. The operation of the venturi scrubber in which liquid is injected into the throat with a large liquid-gas ratio was more advantageous than injection with a high gas velocity at its throat. The lower pressure drop can be obtained when the scrubber, having a large F-value, is operated with a multi-stage connected in a series, rather than in a single-stage. (Author abstract modified)

26955

APTIC NO. 48960

Morris, W. E.

ENGINE-OCTANE QUALITY RELATIONSHIPS - STATE OF THE ART. *Proc. Am. Petrol. Inst., Div. Refining*, vol. 52:48-94, 1972. 14 refs. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

Engine-octane quality relationships are reviewed. The basic factors affecting knock are pressure, temperature, time, and chemical composition, including air-fuel ratio. Because of variation in these factors, road octane numbers are correlated with different combinations of research and motor octane numbers. At a given combination of research and motor octane number, lead content affects road octane number, particularly at high-octane level. At a nominal 93 research octane level, the laboratory octane number (0.2 research + 0.8 motor) of unleaded gasoline must be about one octane higher than that of leaded gasoline to give the same road octane number. Exhaust gas recirculation should decrease the amount of part-throttle knock so that maximum throttle knock will be limiting. The difference in octane requirements is greater for cars with manual transmission than for those with automatic transmission. (Author abstract modified)

26956

APTIC NO. 48517

Mortenson, J. R.

CONTROL OF PARTICULATE EMISSIONS FROM A FLUID CAT CRACKER IN LOS ANGELES. *Proc. Am. Petrol. Inst. Div. Refining*, vol. 52:540-543, 1972. (Presented at the American Petroleum Inst., Div. of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

To meet changing regulations on particulate emissions while increasing gasoline production, a fluid catalytic cracking unit was modified by adding three-stage cyclones, a carbon monoxide boiler, a thermal oxidizer, and two parallel electrostatic precipitators to control emissions at a unit capacity increase from 28,500 to over 50,000 B/day. The design of the original unit and the added modifications and unit operation are reviewed.

26957

APTIC NO. 48958

Mosic, Aleksander, Vukasin Vojinovic, and Sava Savin

HYDRODESULFURIZATION OF THERMALLY CRACKED GAS OIL. (*Hidrodesulfurizacija termicki krekovanog plinskog ulja*). Text in Slovene. *Nafta Broj*, 23(9):426-432, Sept. 1972. 4 refs.

A process for the hydrodesulfurization of thermally cracked gas-oil is reviewed. The consumption of hydrogen in the process amounts to 15 cu N m/ton of thermally cracked gas-oil and 10 units of bromine number, with an additional 40 cu N m/10 kg sulfur if removal of nitrogen, oxygen, and other heterogeneous atoms is required. Overall processing costs, including the costs of the hydrocarbon gases and the raw gas-oil, amount to \$2.028/metric ton.

26958

APTIC NO. 48460

Mowery, C. L.

CATALYTIC CRACKING PARTICULATE EMISSION CONTROL. *Proc. Am. Petrol. Inst. Div. Refining*, vol. 52:544-545, 1972. (Presented at the American Petroleum Inst., Div. of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

The catalytic cracker is the major source of solid bearing effluent gases in most refineries. The control equipment of a heavy oil catalytic cracker was modified and reinforced to meet increasingly rigid pollution regulations and to adjust to increased operation and production loads. The original equipment for a load of 16,000 barrels/day included a deck of 840 multiclones and a two-pass two-stage electrical precipitator. With a load increase to 44,000 barrels/day, two-stage cyclones replaced the multiclones, a two-stage unit replaced the precipitator, and automatic controls were added.

26959

APTIC NO. 48678

Nagayama, Tsutai and Hiroyuki Matsuda

SOME CONSIDERATION ON ENLARGING PHENOMENA OF ELECTRODES OF AN ELECTROSTATIC PRECIPITATOR DUE TO DUST ADHESION. (*Denki shujinki denkyoku no baijin fuchaku ni yoru hidai gensho ni kansuru 2,3 no kosatsu*). Text in Japanese. *Funtai Kogaku Kenkyu Kaishi* (J. Res. Assoc. Powder Technol., Japan), 9(6): 379-391, Nov. 1972. 9 refs.

Electrodes of an electrostatic precipitator are commonly hammered in order to prevent dust adhesion. But all the dust cannot be removed, and with continued operation the electrodes enlarge because of the adhering dust, thus lowering collection efficiency. The relationships between continued operation and electrode enlargement, and electrode enlargement and collection efficiency were studied. Automatic and sequential photographs were taken of the electrodes at an oil-coal mixed firing boiler while it was in operation. Measurements were also made of the acceleration distribution during hammering. An equation was derived to denote the relationship between electrode enlargement and continued operation. An inverse relationship was noted between the mixing rate of heavy oil and maximum electrode enlargement. The strength of dust adhesion to electrodes was larger than that of adhesion due to static charge. Because of moisture and sulfuric acid condensation between dust particles or the particles and electrodes, the adhering particles and electric surfaces are dissolved, and subsequently the solidification or the crystallization of the dissolved materials results in the cross-linking phenomena. (Author abstract modified)

26960

APTIC NO. 48554

Nakamura, Hiroyuki

EMISSION CONTROL OF AUTOMOTIVE GASOLINE ENGINE, PRESENT AND FUTURE. (*Gasorin enjin no haiki taisaku no genjo to shorai*). Text in Japanese. *Jidosha Gijutsu (Automobile Eng.)*, 26(9): 1077-1085, Sept. 1972. 12 refs.

In order to meet U. S. automotive emission standards for 1974, 1975, and 1976, engine operation and design modifications are being studied. Engine operation modifications include carburetion, autochoking, fuel injection, ignition, air injection, thermal and catalytic afterburners, and rich and lean fuel/air ratio modifications. Exhaust gas recirculation can be used to decrease nitrogen oxide emissions, however, exhaust particulates would pollute the recirculation system. Oxidation and reduction catalysis also have disadvantages. A method of trapping particulates has been developed. Methods for reducing carbon monoxide and hydrocarbons are outlined.

26961

APTIC NO. 48576

Nakamura Harutoki

AUTOMOBILE EXHAUST GAS CLEANER. (*Jidosha haigasaku jokasochi*). Text in Japanese. (*Matsushita Electric Industrial Co., Ltd., Kadoma (Japan)*) Japan. Pat. Sho 47-50506. 5p., Dec. 19, 1972. (Appl. Nov. 7, 1969, 1 claim).

A new catalyst exhaust gas cleaner using a newly designed catalyst container and a new type of catalyst is described. The tubular cleaner has a catalyst compartment in its mid-section. Both sides of the compartment are partitioned by a densely perforated metal plate which is lined with stainless metal netting from the inside. The catalyst is made of glass fibers and metal oxides. Hundreds of glass fibers are bonded together to make a glass chopped strand and several hundreds of the strands are used to pack the catalyst compartment. Each strand is coated with a binding agent of borane or silane. The strands are heated at 95-110 C for a few hours for drying and are then immersed in a solution containing cobalt nitrate, copper nitrate, and nickel nitrate. After immersion for 24 hr, they are taken out and dried at 80-90 C in the atmosphere and placed in a heating furnace at 300-400 C to pyrolyze the metallic salt on the surfaces of the strands, thereby producing a mixed metal oxide layer of cobalt, copper, and nickel oxides. Other metallic salts such as chromium, iron, or manganese salts may be used. The strands, each 3-40 mm in diameter, are placed in parallel to the flow of the gas in the catalyst compartment.

26962

APTIC NO. 48577

Nakamura, Harutoki

AUTOMOBILE EXHAUST GAS CLEANER. (*Jidosha haigasaku jokasochi*). Text in Japanese. (*Matsushita Electric Industrial Co., Ltd., Kadoma (Japan)*) Japan. Pat. Sho 47-50510. 3p., Dec. 19, 1972. (Appl. Dec. 15, 1969, 1 claim).

A manufacturing method of the glass chopped strand catalyst primarily used with a catalyst-type exhaust gas cleaner installed in the exhaust system of an automobile is discussed. Basically the same method as offered under Japanese Patent Sho 47-50509, the new method differs in part from the former in that it uses polyester resin instead of epoxy resin for the binding. In this type of the glass chopped strand catalyst manufacturing method, fine glass fibers are bonded together by a binding agent of borane to make a glass chopped strand. Hundreds of the strands are then coated with a catalytic material and put together in the catalyst compartment of the cleaner to make up the packed catalyst strata of the cleaner. The catalyst layer formed on the strands tends to become easily separated from the strands, so that use of an epoxy resin on top of the borane binding agent was suggested by Patent Sho 47-50509, in order to strengthen binding the catalyst layer to the strands. In this method, use of a polyester resin material is

suggested in place of an epoxy resin material. The strands with a borane binding agent are immersed in an acetone solution of polyester resin plus hardening agent and dried at 80-100 C to make the strands coated with the half-hardened polyester film formed on the borane agent layer of the strands. The glass chopped strands are then immersed in an ion exchange water solution of cobalt acetate and chrome nitrate, dried at 80-100 C, and heated at 400-500 C in the atmosphere to harden the polyester resin and pyrolyze the metal salt to metal oxides at the same time.

26963

APTIC NO. 48578

Nakamura, Harutoki

AUTOMOBILE EXHAUST GAS CLEANER. (*Jidosha haigasaku jokasochi*). Text in Japanese. (*Matsushita Electric Industrial Co., Ltd., Kadoma (Japan)*) Japan. Pat. Sho 47-50509. 3p., Dec. 19, 1972. (Appl. Dec. 15, 1969, 1 claim).

Glass chopped strand catalysts can improve the efficiency of an automobile exhaust gas cleaner with less volume and weight of the catalyst. However, the catalytic layer is not bonded completely to the glass chopped strand carriers in some cases, so that it often becomes separated and scattered. This problem can be solved by using a binding agent (usually borane) to bind the glass fibers together to form a glass chopped strand and coating the binding agent with an epoxy resin. The catalytic layer is then formed on the epoxy resin and bonded to the strand carrier by the resin. An epoxy resin properly mixed with a hardening agent is dissolved in acetone. The glass chopped strands with the borane are then immersed in the solution and dried for 2 hr at 80-100 C to half harden the resin. The strands are then immersed in an ion exchange water solution containing cobalt acetate and chrome nitrate, are dried by heating at 80-100 C for 24 hr, and heated at 400-500 C for 4-6 hr to completely harden the epoxy resin and to pyrolyze the metal salt to metal oxides, thus making the catalyst later form on the epoxy resin layer.

26964

APTIC NO. 48835

Nakamura, Harutoki

AUTOMOBILE EXHAUST GAS CLEANER. (*Jidosha haigasaku jokasochi*). Text in Japanese. (*Matsushita Electric Industrial Co., Ltd., Kadoma (Japan)*) Japan. Pat. Sho 47-50507. 5p., Dec. 19, 1972. (Appl. Nov. 7, 1969, 1 claim).

The catalyst composed of glass chopped strands and metal oxide manufactured as discussed under the Japanese Patent Sho 47-50506 is much more effective in cleaning automotive exhaust gas than that using alumina as a carrier. For example, the glass chopped strand catalyst containing the catalyst layer composed of cobalt oxide for 60 parts, copper oxide for 35 parts, and nickel oxide for 5 parts, altogether amounting to 24-30% in weight compared with the glass chopped strands, starts to react at 75-90 C and gives 100% conversion of carbon monoxide to carbon dioxide when placed in contact with nitrogen gas containing 5% carbon monoxide. The alumina catalyst containing the same catalyst layer of metal oxides gives the conversion rate of less than 10% although the reaction-starting temperature is 75-90 C, or the same as the glass chopped strand catalyst. To manufacture the glass chopped strand catalyst, a binding agent is used to bind numerous glass fibers together to make a 30-40 mm diameter bar of strand. When processed to manufacture the glass chopped strand catalyst after the binding agent was removed from the strands, better results can be obtained. After removing the binding agent by means of an acid or organic solvent, the glass chopped strands are immersed in an acetone solution of cobalt naphthenate for 24 hours and then dried at 40-60 C in the atmosphere for 4-6 hours. They are further immersed in a water solution containing 340 g of copper nitrate and 100 g of nickel nitrate for 24 hours, heated at 80-90 C in the atmosphere for 24 hours and then baked at 300-400 C in a heating furnace for activation of the catalyst. About 100-150 l/min of nitrogen gas

CONTROL METHODS

26970

or air/100 g of the catalyst is replaced during the baking process.

26965

APTIC NO. 48480

Naoki, Yasukazu

PERFORMANCE AND PROBLEMS OF AIR FILTERS IMPREGNATED WITH ALKALI. (*Arukari tenchaku firuta no seino to mondaiten*). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo, 10(6):53-58, Dec. 1972. 3 refs.

An air filter impregnated with alkali can remove harmful gases by a chemical reaction such as neutralization of acidic gases. Sodium hydroxide and sodium carbonate are often used as alkaline agents. The alkali-impregnated filter gives a higher removal efficiency for chlorine, hydrogen fluoride, and hydrogen sulfide than normal filters. The efficiency is poor for nitrogen dioxide. Carbon monoxide and carbon dioxide can be removed in the early stages of use, but the removal efficiency drops so rapidly that it is not practical. Humidity, temperature, sulfur dioxide concentration, filter thickness, and flow rates affect SO₂ removal efficiency. The filters are greatly affected by humidity, so they should be used at low humidities. Dispersal of the absorbent or substances formed as a result of the reaction should be avoided by using a flow rate of 0.5 m/sec or lower and an adhesive agent. Maintenance and disposal of used filters can also be a problem.

26966

APTIC NO. 48615

Newcomer, J. L.

ELIMINATES FRYING ODORS. *Food Eng.*, 44(11):123, Nov. 1972.

Odors emitted from a food processing operation were efficiently controlled by an incineration process integrated with heat and water reclamation. Odor laden entrained air was isolated, blown into the furnace of a gas-fired cooking oil heat exchanger, and mixed with the normal combustion air for incineration. The normally wasted heat that dissipates as steam was reclaimed as hot water.

26967

APTIC NO. 48466

Oberdorfer, Paul E.

COMPRESSION RATIO, EMISSIONS, OCTANES, AND FUEL ECONOMY -- AN EXPERIMENTAL STUDY. *Proc. Am. Petrol. Inst. Div. Refining*, vol. 52:936-953, 1972. 4 refs. (Presented at the American Petroleum Inst. Div. of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

The effect of changing the compression ratio on exhaust mass emissions, fuel economy, octanes, and automobile performance factors was investigated. The equipment, operating ground rules, test cycles, sampling, analysis, and test results are reviewed. The overall effect of varying the compression ratio from 6:1 through 10:1 on mass emissions include an increase in carbon monoxide emissions by a factor of nearly 10 in going from 10:1 to 6:1 with intermediate emission values for intermediate compression ratios and a reduction in nitrogen oxide emissions to some extent at the lower compression ratio, but not nearly in proportion to the CO increase; hydrocarbon mass emissions remained nearly constant as the ratios decreased. A reduction of the compression ratio also reduced fuel economy, octane requirement, power output, and driveability limits. Retarding spark within practical limits reduced NO_x and hydrocarbon mass emissions, increased CO emissions, and reduced fuel economy. (Author summary modified)

26968

APTIC NO. 48559

Ochi, Noritaka

VARIOUS DUST COLLECTORS AND THEIR USEFUL APPLICATIONS. (*Kakushu shujin sochi to sono tekiyo ni suite*). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, p. 11-30, 1972. (Presented

at the Seminar on Recent Technology on Public Pollution Control, 370th, Fukuoka, Japan, Dec. 11-12, 1972.)

Basic design elements during dust collection include scrutiny of operational processes, characteristics of dusts, measurement of dust, particle size distribution, electrical characteristics of dusts, characteristics of the stack gas, humidity, cooling, and filter materials. Dust collectors are divided into dry (dust chambers, bag filters, cyclones, electrostatic precipitators, and fabric filters) and wet (spray towers, venturi scrubbers, impingement scrubbers, fan scrubbers, and wet electrostatic precipitators) dust collectors. Dust collecting characteristics are discussed including performance, costs, and operational factors.

26969

APTIC NO. 48676

Odaira, Toshio, Kimio Kubota, Yasuo Iida, Koichi Inoue, and Kunio Yoshizumi

THE COMPARISON OF UNUSED AND USED CATALYSTS FOR CONVERTERS. (*Conbata yo shokubai no shiyo ni yoru bussei henka*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 323. (Nov. 7-9, Paper 270.)

Some basic studies were made on the catalytic combustion device for automotive exhaust gas. Using a market-sold catalyst for an afterburner, the changes of properties that are caused by the catalytic reactions were studied. A 3000 km driving test was given to an automobile with a 20,000 km mileage, a four-cycle, four-cylinder, and 1600 cu cm capacity engine, and the property changes of the catalyst were examined by an X-ray refraction apparatus, fluorescent X-ray, TET, differential thermoanalysis, and a hardness matter. The specific surface area decreased from 120 sq m/g to 51 sq m/g after use. The hardness decreased to 1/4 of the original, from 10 kg to 2.5 kg. The catalyst before the use contained much copper, and small amounts of iron and chromium. After use, much lead was detected. The crystallization structure showed the disappearance of copper oxide and a strong peak of CuAl₂O₄ after use, and this was similar to the structure of an unused catalyst baked for 3 hr at 800 C. The DTA measurements did not show much difference before and after use. The deterioration of activity of a catalyst seemed to depend on the crystal structure changes, the decrease of the surface area, and the effect of Pb.

26970

APTIC NO. 48862

Oetterer, Dietmar

THE PTX ENGINE EXHAUST GAS CLEANER, A NEW DRY CLEANER, FOR EXHAUST GASES FROM SMALL CARS. (*Der PTX-Motor-Abgasreiniger, ein neuer Trockenreiniger fuer Motorabgase bei Flurloerzeugen*). Text in German. *Glaser's Ann.*, 96(11):351-352, Nov. 1972.

The PTX engine exhaust gas cleaner is a small catalytic afterburner. For a 5-liter engine the afterburner has a length of 330 mm and a maximum diameter of 162 mm. The afterburner must be installed as close to the engine as possible to utilize the full heat of the exhaust gases coming from the engine. The afterburner is mainly suitable for installation in fork lifts and small vehicles of a similar kind. The efficiency of the afterburner installed after a diesel engine for the removal of acrolein ranges from 63.6% during idling, and 79.1% at partial load, to 81.2% at full load; for the removal of aliphatic aldehyde from 51.3 and 79.1% to 73%. For an Otto-engine fork lift, the hydrocarbon concentration in the exhausts is reduced from 498 ppm to 107 ppm at idling, at 800 rpm/min, and with an unloaded vehicle; from 525 ppm to 26 ppm (95%) at partial load operation; and from 328 ppm to 42 ppm (87.2%) at full load operation.

26971

APTIC NO. 48738

Ogawa, Akira, Kikaku Ikemori, Munenori Hirasawa, and Kazuo Komuro

ON THE FLOW PATTERN AND THE CUT SIZE OF PARTICLES IN A ROTARY FLOW DUST COLLECTOR. (*Niji kiryugata saikuron no furo patan to genkai syushikei no riron*). Text in Japanese. *Funtai Kogaku Kenkyo Kaishi* (J. Res. Assoc. Powder Technol., Japan), 9(6):371-378, Nov. 1972, 9 refs.

A rotary flow dust collector of the type developed in West Germany (D.S.E. type) was investigated. The D.S.E.-type collector reportedly gives a smaller cut size of particles compared with that given by an ordinary cyclone. The collection efficiency of the rotary flow dust collector was studied, using talc powder. Measurements of the particle distribution of the powder escaping from the collector and of the powder supplied were made with a six-stage cascade impactor. The fractional efficiency of the collector was obtained for a given operating condition. The flow pattern was analyzed from the velocity distribution of axial components of spiral flow. Results indicated that 60% of the secondary air strengthens the angular momentum of the helical upward flow of the primary air. The cut size of the particles was calculated from the equation by using the experimental values for the peripheral velocity components at the surface of the virtual cylinder and for the radially inward flow components. Cut sizes determined theoretically coincided with those obtained from the measured fractional efficiency.

26972

APTIC NO. 48823

Ohki, Teruo

NKK SYSTEM LIME GYPSUM DESULFURIZATION PLANT. (*NKK shiki sekkaiseki sekkoho haen datsuryu setsubi*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.* 13th, 1972, p. 140. (Nov. 7-9, Paper 95.)

The desulfurization process of the Nippon Kokan Co incorporates a lime gypsum processing system as an effective step to minimize the outflow of gaseous sulfur oxides from its sulfuric acid plant. The process has a variety of advantages, which include usability of low-cost lime as an absorbing material, having gypsum as the byproduct, no secondary pollution, and an outstanding rate of desulfurization. According to the Smoke Exhaust Control Law enacted in June 1963, the containment ratio of sulfur dioxide and sulfur trioxide in any exhaust smoke may not exceed 0.22 vol%. At Nippon Kokan, however, the density of exhaust smoke started to surmount the required level, registering 0.25-0.3 vol%. The legal exhaust restriction rate has been boosted and the current desulfurizing capability is at the maximum rate of 95%. The process flow system consists of the following four processes: absorption, pH control, oxidation, and gypsum separation. Exhaust smoke first goes through a spray tower, where carbide is used, and SO₂ is absorbed and removed in this process. Slurry is supplied into the pH control tower in which it is subjected to pH control through a 7% SO₂ gas. The slurry is transported to the oxidation tower where it is oxidized with air, and high-quality gypsum is thus obtained. Process operations have hitherto produced the volume of processed gas of 62,500 N cu m/hr (70-80 C), the density of SO₂ of 2000-3000 (at entrance) and 100-150 ppm (at exit). Applications of this desulfurization process will require additional installation of cleaning process using refrigeration, and replacing the pH control tower with a spray tower.

26973

APTIC NO. 48650

Oiwa, Michikazu

STACK GAS SCRUBBER/DISPOSAL DEVICE. (*Haen senjo shori sochi*). Text in Japanese. (*Kajima Corp., Tokyo (Japan)*) *Japan. Pat. Sho* 47-50703, 4p., Dec. 20, 1972. (Appl. March 14, 1970, 1 claim.)

A stack gas scrubber was designed to remove sulfur oxides from heavy oil boiler stack gas. Unlike conventional devices which have stack gas storage tanks, this device has no tanks and is more compact. The flue gas of a higher concentration with an accelerated flow velocity meets the scrubbing agent immediately before entering the stack. Higher neutralization and scrubbing efficiency result. Cooling water and ammonia gas injection nozzles are placed in the flue so that they can inject or spray water and ammonia in the same direction as the stack gas flow. A scrubbing pipe with water spray nozzles is upright along the vertical center of the scrubber casing. Flue gas is first cooled and mixed with ammonia in the flue. Then it enters the scrubber and is sprayed with water from the nozzles of the scrubbing pipe. It is then strained by strainers in the lower half of the casing and sucked into the upright stack by a blower.

26974

APTIC NO. 48817

Okada, Yoshitaro

ON STACK GAS DESULFURIZATION DEVICE FOR MEDIUM AND SMALL-SIZED BOILERS. (*Chusho boira yo haen datsuryu sochi no tsuite*). Text in Japanese. Preprint, *Japan Heat Management Assoc., Tokyo*, p. 53-59, 1972. (Presented at the Conference of the Japan Heat Management Association, 13th, Tokyo, Japan, Oct. 18-20, 1972, Paper 6.)

A No. 2-type stack gas desulfurization device is used in various firms. In the device, the flow of the stack gas is first adjusted by the damper, then cooled to 100 C by the pre-cooling spray, and taken in a tangential direction into the cylindrical scrubbing chamber. The gas flows through the chamber toward the blower. The absorbent liquid (caustic soda) is led through a pipe into the rotary drum revolving at high speed. The liquid pressure in the drum rises to 2 to 3 atm due to the centrifugal force generated by revolution of the drum. The liquid thus becomes atomized as it is sprayed through the special nozzles of the drum into the scrubbing chamber. Since the gas crosses this turning current of the atomized absorbent liquid at a right angle, both desulfurization and dust removal are achieved with the highest efficiency. The cleaned gas is further washed and cooled by the after-cooling spray and treated by the gas-liquid separator before finally being discharged into the atmosphere. The device is smaller, easier to operate and maintain, less expensive, and more efficient than other systems.

26975

APTIC NO. 48699

Oki, Teruo

NKK S LIME GYPSUM DESULFURIZATION PLANT. (*NKK-shiki sekkai sekkoho haen datsuryu setsubi*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 140. (Nov. 7-9, Paper 95.)

A pilot plant of the Nippon Kokan Co. with the capacity of 2000 N cu m/hr was constructed in 1971 for the desulfurization of stack gas. Lime gypsum is the byproduct. The stack gas contains 0.25-0.30 vol% sulfur dioxide and sulfur trioxide. The process flow comprises absorption, pH adjustment, oxidation, and gypsum separation. The stack gas is sent to the spray tower where SO₂ is absorbed by carbide residues. The pH of slurry is adjusted by 7% SO₂ gas and the slurry is sent to the oxidation tower, where the air is blown into it and quality gypsum is produced. The gypsum slurry is separated by a centrifugal separator. The quantity of treated gas is 62,500 N cu m/hr (70-80 C); SO₂ concentration is 2000-3000 ppm at the entrance, and 100-150 ppm at the exit. The desulfurization capacity is 94-96%.

26976

APTIC NO. 48692

Onnen, James H.

WET SCRUBBERS TACKLE POLLUTION. *Environ. Sci. Technol.*, 6(12):994-998, Nov. 1972.

CONTROL METHODS

26982

The design, different types, costs, and applications of custom-designed scrubber systems are reviewed. The most widely used scrubber for high efficiency removal of smoke or fume-sized particles is the venturi type, but fixed or mobile type scrubbers are steadily gaining wide acceptance. A well-designed system can be applied to sulfur dioxide, fly ash, dust or fume control problems in steelmaking, (oxygen converters) foundries (cupolas), nonferrous metal production, chemical processing, fertilizer production, and electric power generating plants (boilers). Wet scrubbing with the possibility for product reuse or recovery is also reviewed.

26977

APTIC NO. 48549

Opalko, S.

THE CHEMICAL INDUSTRY IN THE BATTLE WITH ENVIRONMENTAL POLLUTION AS EXEMPLIFIED BY THE NITROGEN ENTERPRISES IN TARNOV. *Intern. Chem. Eng.*, 12(4):665-669, Oct. 1972. (Also: *Przem. Chem.*, no. 5:278-281, 1972.)

During the last decade the Nitrogen Enterprises in Tarnov, Poland, increased production of a series of organic and inorganic products, including nitrogen fertilizers, caprolactam, chlorine, polyvinyl chloride, and acrylonitrile. Simultaneously with the new production capacity, substantial funds were allocated for construction of facilities to reduce air and water pollution. Biological and chemical purification plants were built to reduce, respectively, the phenol content of waste water from caprolactam units and the cyanide content of waste water from the acrylonitrile plant. Phenol concentrations in purified waste waters were 0.1-0.5 mg/l; cyanide ion concentrations was 0.5-2 mg/l. A central purification plant was built in which waste waters are subjected to successive coagulation by aluminum sulfate and milk of lime, and to separation of precipitates and suspensions in settlers. This purification method reduces suspensions by 70% and other impurities by 15-20%. By-product wastes, including ash, carbide lime, and soot, are transported hydraulically and stored in a multisectional dump. Methods for utilizing these wastes are under study together with methods for reducing sulfur dioxide and nitrogen oxides emissions.

26978

APTIC NO. 48882

Ota, Masanori

PURIFICATION DEVICE FOR POLLUTED GAS. (*Osen-kitai no jokasochi*). Text in Japanese. (Assignee not given.) *Japan. Pat. Sho* 47-50514. *Sp.*, Dec. 19, 1972. (Appl. July 18, 1970, 1 claim.)

When polluted air or waste gas is taken into an air-tight container with the intake port on the bottom and the exhaust port on the top side in which a high temperature supersaturated steam is jetted into the gas and the gas is then cooled as it ascends, the steam becomes mist and the mist grows into water droplets while ascending. The droplets grow into larger water drops which eventually fall. A gas treated this way contains few impurities. A scrubber was designed which comes in a tubular casing with the gas intake port on the lower side and the treated gas discharge port on the top side. Two scrubbing water spray tanks, each with a number of holes on the side wall are fixed onto a rotary shaft. Also fixed onto the shaft is a Silocco fan located above the tanks. The main scrubbing water tank is connected to the bottom of the casing by a pipeline. Another pipeline connects the upper spray tank to the main water tank. Between the two spray tanks is the scrubbing water receiver pan fitted to the internal wall of the casing. When gas is taken in, a supersaturated steam is first jetted into the gas. As the shaft is driven, the Silocco fan as well as the spray tanks revolve. The gas is thus scrubbed and cooled with water sprayed horizontally from the spray tanks. The treated gas is sucked and discharged out of the scrubber by the Silocco fan. The water is circulated by the pump.

26979

APTIC NO. 48896

Palmer, J. David

ATMOSPHERIC CORROSION CAN BE AVOIDED. *Can. Chem. Process.*, 56(9): 47-48, Sept. 1972.

Proper control of atmospheric corrosion of mild steel and other metals begins in the mechanical design stage where attention must be given to keeping all surfaces as crevice-free as possible. It continues through the fabrication stage where surface defects, sharp corners, and surface soils must be eliminated; and is completed in the field where a good coating must be applied under specified and inspected conditions. Zinc is a durable protective coating and also an excellent primer for more attractive and chemically resistant top-coats. The wear life of zinc coatings depends on the thickness; in industrial areas it is 8-10 yr for a 2.1 mil thick coating. Humidity, salt, and pollution will increase corrosion.

26980

APTIC NO. 48552

Radway, J. E. and Dick Rohrbach

ALTERNATIVES OPEN TO INDUSTRY FOR CONTROLLING POWER PLANT POLLUTION. *Rubber World*, 167(2):53-54, 56, Nov. 1972.

Alternative pollution control approaches and their costs are discussed in terms of a hypothetical power plant burning 3% sulfur coal to produce 48,000 lbs of steam/day. The alternatives are low-sulfur coal, natural gas, low-sulfur oil, limestone scrubbing of flue gases, and the new Chemico-basic magnesia recycle system. In this system, flue gas is scrubbed with magnesium oxide which reacts with sulfur dioxide to form insoluble magnesium sulfite. The magnesium sulfite is heated to 1600 F to drive off concentrated SO₂ suitable for sulfuric acid production and to regenerate the magnesium oxide, which is returned to the scrubbing system. Conversion to low-sulfur oil would involve a \$100,000 investment and increase fuel costs by \$90,000/yr. Economically, this would appear to be the best solution. However, scrubbing systems enable the continued use of relatively cheap high-sulfur fuels. Compared with limestone scrubbing, the Chemico-Basic magnesia recycle system has the advantages of no additional solid waste, no risk of water pollution, nominal equipment scaling, and recovery of sulfur values in a marketable form. Capital investment costs should be roughly comparable to those for a lime system (\$350,000) but operating costs should be lower (\$109,000).

26981

APTIC NO. 48851

Rasch, R.

CHEMICAL BONDING OF HYDROGEN CHLORIDE IN FLUE GASES ORIGINATING FROM REFUSE INCINERATORS. (*Ueber die chemische Bindung von Chlorwasserstoff in den Rauchgasen von Müllverbrennungsanlagen*). Text in German. *Aufbereitungstechnik*, 13(12):772-776, 1972. 13 refs.

The new determination of maximum permissible emissions of hydrogen chloride will require a number of large refuse incinerators to provide additional flue gas cleaning. So far only scrubbing has been known for eliminating hydrogen chloride. The operating principle of a scrubber for throughputs to 50,000 cu m/hr is briefly reviewed. Parallel to the wet removal of HCl from the flue gases of incinerators, dry bonding to quicklime will gain increasing importance. However, the process is efficient only at gas temperatures below 400 C. A ratio between chloride and oxide of more than 10 to 1 is required for the beginning of a noticeable chemical bonding.

26982

APTIC NO. 48774

Ries, Kenneth M.

TECHNIQUES FOR SOLVING ODOR PROBLEMS. Preprint, *Sp.*, 1972. 15 refs. (Presented at the International Pollution Engineering Congress, Cleveland, Ohio, Dec. 4-6, 1972. Paper 11b.)

The three basic approaches to odor control are elimination of the source, elimination of odor perception, and treatment to reduce odor. If it can be used, source removal often solves the problem. Elimination of perception is increasingly viewed as unethical. Accepted odor treatment methods are condensation, scrubbing, chemical oxidation, carbon adsorption, and incineration. These methods are compared with respect to best application, costs, and range of effectiveness. In the meat industry, three problem areas are feedlot, smokehouse, and rendering odors. Measures taken to control these odors are cited.

26983

APTIC NO. 48805

Schwartz, Werner and Werner Eisert

EXAMPLES AND LIMITS OF COMBATING AIR POLLUTION IN COPPER PLANTS. (*Beispiele und Grenzen der Reinhaltung von Luft in Kupferhuetten*). Text in German. Z. Erzbergbau Metallhuettenwesen, 25(10):505-511, 1972. 6 refs. (Presented at the Gesellschaft Deutscher Metalluetten- und Bergleute Hauptversammlung, Stuttgart, West Germany, April 28, 1972.)

Any dust and metal recovery in copper plants, as well as the reduction of emissions depends on the special type of raw copper processing plant. In pre-roasting plants, the waste gas quantity amounts to only 43% of that from a greenfeed plant. In the flash plant, the waste gas quantity is only 33% of that of the greenfeed plant. The large waste gas quantity of the greenfeed plant, however, contains only small sulfur dioxide and trioxide concentrations for which no economic recovery process is available. Nearly the entire amount of sulfur is discharged into the atmosphere. In the case of the pre-roasting plant, only 12% of the sulfur is directly emitted. Prior to any sulfur recovery, the waste gases must be thoroughly cleaned of dust and interfering components. The waste gases usually carry various pollutants along which require different collection methods. Dust and fumes are retained in hot gas electrostatic precipitators which operate at temperatures between 300 and 400 C. Volatile substances (mercury) and gaseous substances (hydrogen chloride and hydrogen fluoride) can be removed in high-capacity scrubbers. Knowledge of the developmental process of the system is necessary for an optimum solution of the gas cleaning problem. The costs depend primarily on the gas quantity to be treated. Costs rise progressively with the desired collection efficiency.

26984

APTIC NO. 48879

Shirasawa, Tadao, Zenichi Kawase, and Kazuko Mizukami

THE REMOVAL OF FLUORIDES BY PACKED TOWER. (*Jutento ni yoru fusso kagobutsu no jokyo ni tsuite*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 149. (Nov. 7-9, Paper 104.)

Recently the number of tile manufacturing factories have increased in northern Saitama Prefecture where mulberry trees are grown for the silkworm industry. Damages to mulberry leaves by fluoride emissions from these factories have been noticed, so fluoride control systems were installed in many of these plants. The system generally utilizes caustic soda alkaline scrubbers for the flue gas; due to the lack of an ideal waste water drainage, water is recirculated. Sodium fluoride is recovered and lime is added, producing calcium fluoride. The two kinds of systems used in this area both employ packed towers. System A employs terralite packing and two-stage net shelves in the upper part of the scrubber. The gas is cooled before entering the scrubber, which is made of plastic. System B utilizes slate tile waste as the packing material in the tower to lower cost, and the tower is made of mortar cement. It has an automatic pH adjuster in order to save manpower. These systems have eliminated most hydrogen fluoride from the flue gases of the plants. Now the concentration is less than 1 ppm at the exit. Sulfur dioxide in the emission gas is also almost completely eliminated. The damages to mulberry leaves have been successfully controlled.

26985

APTIC NO. 48759

Schleikinov, V. M. and M. A. Sobolev

AN INVESTIGATION OF A WATER-EVAPORATION PROCESS FOR COOLING AIR IN THE SCRUBBERS OF AIR SEPARATION PLANTS. *Intern. Chem. Eng.*, 12(4):662-664, Oct. 1972. 10 refs.

A theoretical investigation of the water-evaporation process for cooling air in air separation plant scrubbers is discussed. A two-stage nitrogen scrubber operates at almost atmospheric pressure, therefore the flow of energy required to provide an additional quantity of water into the scrubber is less than the energy used to produce the same cooling effect in a complete refrigerating machine. The water evaporation process of cooling air in a two-stage scrubber is thermodynamically more reversible than in a one-stage system. In this case, 0.5026 kg water cooled to 11 C is supplied from the second stage of the nitrogen scrubber. As the temperature of the compressed air increases to 35 C and above, the temperature and quantity of water supplied from the second stage to the usage points will increase. At air temperatures above 45 C it is more reasonable to use a three-stage scrubber.

26986

APTIC NO. 48917

Shreve, R. F.

THE RESIN SUPPLIER'S STAKE IN AIR POLLUTION CONTROL. *Amer. Paint J. Conv. Daily*, 1972:33, Nov. 1, 1972.

There are at least four different approaches to controlling or eliminating emissions from paint manufacturing processes: coatings with approved organic solvent systems, 100% solids reactive systems, water-based vehicles, and powder coatings. The role of the resin supplier in each of these approaches is reviewed. Trends and uses are projected.

26987

APTIC NO. 48763

Sisselman, Robert

COAL GASIFICATION A PARTIAL SOLUTION TO THE ENERGY CRISIS. *Mining Engineering*, 24(10):71-78, Oct. 1972.

coal gasification for the production of synthetic natural gas as a partial solution to the energy crisis is reviewed. Synthetic natural gas may be produced in one of three systems: fixed bed units requiring pretreatment of caking coals; fluid bed units; and entrained bed units. The process designs and operating variables, comparative advantages and disadvantages, costs, and commercial feasibility parameters are examined.

26988

APTIC NO. 48959

Stewart, A. C.

THE FUTURE OF OXYGENATED SOLVENTS. *Am. Paint J. Conv. Daily*, 1972:38, Nov. 1, 1972.

Future sales growth will be limited for oxygenated solvents of high photochemical reactivity or nonexempt under certain air pollution control legislation. In this classification are branched ketones or solvents containing olefinic linkages. Less photochemically reactive solvents (esters, glycolethers, and alcohols) will also show a sales rate decline as a result of changes in coating technology. Technologies that meet ecological needs include nonaqueous dispersion systems, water-borne coatings, powder coatings, and reactive coatings. The greatest use of these new technologies will be made by industries that are presently large consumers of paint, such as the transportation equipment industry, manufacturers of fabricated metal products, and electrical equipment and supplies.

26989

APTIC NO. 48569

Stuckey, A. N., B. T. Fant, J. H. Durr, and G. A. Mickelson

GO-FINING GOES LOW PRESSURE. *Proc. Am. Petrol. Inst. Div. Refining*, vol. 52:655-664, 1972. 4 refs. (Presented at the American Petroleum Inst., Div. of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

CONTROL METHODS

26995

Vacuum gas oil desulfurization is a major refining process with an installed capacity of over 860 thousand barrels/day in the free world. GO-FINING, a hydrosulfurization process, accounts for about 46% of this capacity. Operating the process at lower pressures can offer economic advantages in both investment and operating costs, primarily through savings in hydrogen consumption and reduced pressure ratings for major equipment. Pilot plant data on the feasibility of a lower pressure operation and data on hydrogen consumption savings are presented. (Author abstract modified)

26990

APTIC NO. 48503

Suzuki, Shoichi

EXAMPLE INSTALLATION OF A GAS-REMOVING FILTER. (*Gasu jokyo firuta no setchirei*). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(6):62-66, Dec. 1972. 3 refs.

Following a general discussion of active carbon filters and their applications, performance test results are discussed, especially the sulfur dioxide removing efficiency of an active carbon air filter installed in a building in Tokyo for the purpose of protecting works of art and cleaning the indoor air. Active carbon filters are generally used for removing harmful gases from outside air brought indoors, for removing harmful gases from exhaust gas, and for removing impurities from the air circulating indoors. The filter generally uses active carbon whose grain size ranges from 4 to 10 micron. It comes in two types, the parallel type used where more space is available for installation and the V-shaped type for installation in a limited space. The active carbon filter installed in a Tokyo building uses the W-shaped filter element made by filling active carbon between two parallel plates bent into a W shape. This filter handles a wind volume of 28 cu m/min/unit element and gives a pressure loss of 6 mm Aq. The filter elements are installed in a V arrangement in order to save space. Using an automatic gas sampler and a conductometric analyzer, the SO₂ removing efficiency of the filter was measured on three different days in the same month, several times a day. The average efficiency of SO₂ removal was 83.2% for the first day, 84.2% for the second day, and 81.5% for the third day.

26991

APTIC NO. 48540

Tamori, Yukio, Nobuyuki Kogure, Keigo Nakamura, Kazunari Imagami, and Masashi Matsumoto

EFFECT OF SULFUR OXIDES ON GLASS FIBER FILTERS. (*Garasu seni firuta e no io sankabutsu no eikyo*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 127. (Nov. 7-9, Paper 82.)

Experiments were conducted to examine whether sulfur dioxide, sulfur trioxide, or sulfuric acid are adsorbed by filter material. Filters were maintained at a normal temperature, 100 C, 200 C, and 300 C, and a standard gas (SO₂ plus nitrogen) was supplied from a pump. The filters used were glass fiber and quartz fiber. A thermobalance indicator was used. Three kinds of filter paper had various adsorption capacities. When the gas concentration was 500 ppm, the rate ranged between 0.03 and 0.06%, but at 2000 ppm concentration, the percentages were between 0.17 and 0.03%. When SO₂ of 1000 ppm concentration was used, the maximum adsorption rate was 0.53%. Generally, the lower the temperature, the more adsorption occurred, and the peak appeared at 100 C. In any case, the adsorption quantity by the single element of SO₂ gas was very limited, but quartz filter material was the best with a small adsorption quantity.

26992

APTIC NO. 48934

Teplý, Stan

PEDESTRIAN ZONE IN MUNICH: MOTIVATION FOR PEDESTRIAN MOVEMENT. *Traffic Eng.*, 43(2):18-27, Nov. 1972. 18 refs.

To reduce traffic in the central business and shopping district of Munich, a main thoroughfare was converted to a pedestrian zone. The zone crosses the old town for a length of 2850 ft; its width ranges from 38-148 ft and averages 82 ft. Two large squares form the entrance and exit to the thoroughfare, which is easily accessible by buses, street cars, underground railway, and regional railway. On an average working day pedestrian volume is 6000-15,000/hr. Measured noise levels in the zone were high but lower than in a comparable street not closed to vehicles. Air pollution levels for hydrocarbons and carbon monoxide were high in both streets, indicating that the air pollution level of the pedestrian zone is dependent on the general level in the city center.

26993

APTIC NO. 48483

Terada, Hiroshi

PERFORMANCE AND PROBLEMS OF AN ACTIVE CARBON FILTER. (*Kasseitan diruta no seino to mon-daiten*). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(6):12-26, Dec. 1972. 20 refs.

The effects of air pollution on plants, human health, and animals, automobile pollution, sulfur content in crude oil, and the increasing consumption of petroleum by electric power generation are briefly discussed. Active carbon filters can be used to adsorb various pollutant gases, even at low concentrations. The active carbon is unaffected by atmospheric humidity and can remove sulfur dioxide. Gas flow velocity should be kept at 0.5 m/sec or lower. The filter casing should be packed evenly with active carbon so that the polluted gas can completely contact the active carbon layer. Types of active carbon filters, maintenance of the filter, and filter efficiency are discussed.

26994

APTIC NO. 48497

Tohata, Heiichiro, Seitaro Kato, and Shigeyuki Yoshino

CONTROL TECHNIQUES FOR NITROGEN OXIDES FROM INDUSTRIAL AND CHEMICAL PROCESSES. (*Koho haigasu-chu no chisso sankabutsu no shori gijutsu*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 147. (Nov. 7-9, Paper 102.)

The absorption, and catalytic reduction methods are used for the treatment of low concentrations of nitrogen oxides emitted from chemical factories. The method most frequently used is absorption. Experiments were conducted to select the best absorbent for NO_x. The bubbling method with glass filters was used for the experiments. Standard nitric oxide of 1100 ppm concentration and nitrogen dioxide of 1300 ppm were used. The amount of absorbent was 100 ml and the gas flow speed was 150 ml/min. Colorimetry by the Saltzman and the naphthyl ethylene diamine method were used for analyses. With any absorbent, a plateau was reached within 30 min of the beginning of the experiment, and a slow decline appeared in the absorption rate. Good results were obtained by a hydrochloric acid soda and by a potassium permanganate solution.

26995

APTIC NO. 48793

Tomioka, Kaoru

SMOKE DESULFURIZATION EQUIPMENT. (*Haiei dat-suryu sochi no tsuite*). Text in Japanese. Kankyo Kenkyu (Environ. Studies), no. 2:77-83, Dec. 1972.

Oil occupies 70% of the primary energy supply in Japan, so that desulfurization of smoke must be carried out, since there is a limit to supplies of low sulfur oil. In 1973, desulfurization of heavy oil will reach 800,000 barrels. Burning of crude oil in 1972 increased to 17 million kl. Liquid natural gas began to be imported in the last half of 1969, and its import will reach 5.1 million tons in 1975. Smoke desulfurization is the most practical and promising control method. The activated manganese oxide method has been put into practice at the Yokkaichi

Thermal Generating station of the Chubu Power Co. with 326,500 N cu m/hr capacity. The activated coal method is being practiced at the Kashima Thermal Generating Station of the Tokyo Power Co. with 420,000 N cu m/hr capacity. Sakaiminato Generating Station of the Kansai Power Co. will start operating soon with a 175,000 N cu m/hr capacity. These dry methods require big equipment, and wet methods, more compact in size, have been adopted by most plants. There are 11 factories of the petroleum, paper, steel, pulp, aluminum, and synthetic rubber industries which operate wet-type desulfurization equipment with more than 150,000 N cu m/hr capacity. Wet-type desulfurization is capable of being of bigger capacity, and the desulfurization cost is less than that of the dry method. However, the dry method does have the advantage of having a better diffusion effect, not requiring any chemical treatment. Special low interest loans are given by the Japan Development Bank to finance desulfurization equipment; special depreciation rates and tax measures are also applied. In order to promote desulfurization of smoke, further preferential treatment and effective steps for by-products will be necessary.

26996

APTIC NO. 48755

Toogood, John B.

A LATEX PRODUCER LOOKS AT THE SEALANT INDUSTRY. *Adhes. Age*, 15(117):27-29, Nov. 1972.

The effect of environmental legislation on the sealant industry is discussed. Stringent restrictions on the use of organic solvents and the attendant hydrocarbon emissions are included in the 1970 Clean Air Act; air contamination regulations of the Occupational Safety and Health Administration (OSHA) must also be complied with. Research is being done on the development of acrylic latex sealants. Unlike organic solvent-based products, latex sealants do not contribute to air pollution through hydrocarbon emission either during manufacture or application. Because of their outstanding properties and ability to comply with anti-pollution legislation, latex sealants can be effectively substituted for competitive solvent-based products in many applications. Notable latex sealant properties are listed and their various applications as coatings and adhesives in housing and construction industries are described.

26997

APTIC NO. 48967

Trauffer, Walter E.

NEW LIGHTWEIGHT AGGREGATE PLANT OF HERCULES INCORPORATED. *Pit Quarry*, 65(4):106-113, Oct. 1972.

The environmental control program of a plant producing lightweight aggregate from slate is described. Water sprays eliminate blowing of dust from stockpiles, conveyors, bin feeders, transfer chutes, and rail loading bins. Plant roads, including the road between the slate quarry and plant hopper, are regularly sprinkled in dry weather. The kilns operate on natural gas most of the year; kiln exhaust gases go through individual multi-cyclone collectors and a common baghouse. Kiln feed and dust bins are fully enclosed and have vent collectors. Air is regularly sampled with a portable sampler. Process water comes from wells and is recirculated and reused. A large impoundment basin protects a trout stream running through the plant grounds from any possible contamination.

26998

APTIC NO. 48553

Tsujimura, Kinji

COUNTERMEASURE AGAINST EXHAUST AND NOISE EMISSIONS OF DIESEL ENGINES, NOW AND FUTURE. (*Jiizeru enjin no kogai taisaku no genjo to shorai*). Text in Japanese. *Jidosha Gijutsu (Automobile Eng.)*, 26(9):1086-1091, Sept. 1972.

Diesel engine exhausts containing nitrogen oxides, hydrocarbons, carbon monoxide, and sulfur dioxide must be controlled

by methods such as controlling fuel injection, exhaust gas recirculation, water injection, and air cooling. Advantages and disadvantages of these methods are described. Methods for reducing diesel engine noise are also discussed.

26999

APTIC NO. 48821

Waddington, J. N.

DUST AND GRIT CONTROL IN THE CEMENT INDUSTRY. *Cement Technol.*, 3(5):188-193, Sept./Oct. 1972.

Dust and grit control in the cement industry is discussed. A general survey of the main manufacturing processes are given, and the dust control operations at each point of the system are described. During preparation of the raw material, water is used for damping down potential nuisance sources in the wet process. In the dry process, fabric filters are used in the grinding mills to clean up to 80,000 cu ft/min of air at 120 C before release into the atmosphere. Fabric filters are also used for venting fluidized air in the blending stage. The hot gases from the kilns present the largest volume of air to be treated at the plant. Dust composition is that of the raw materials with small quantities of ash and decarbonated material in the dry kilns; and that of water vapor with some sulfur dioxide and volatile alkalis in the wet process. Preheated cyclones are used to pre-clean gases from the kilns and clinker cooler gas. High temperature fabric filters are being developed to provide a practical alternative to electrostatic precipitation. At all conveyor loading, transfer and discharge points, nuisance dust arises, which is dealt with by hooding, duct work, separate fabric filters, and the use of small integral unit fan located at the dust source. The characteristics and limitations of fabric filters are compared with those of electrostatic precipitators. Cost of pollution control is also considered.

27000

APTIC NO. 48539

Walder, C. J.

CAN DIESELS MEET 1975 CALIFORNIA EMISSIONS LIMITS? *Automotive Eng.*, 80(12):27-30, Dec. 1972. (Presented at the Society of Automotive Engineers, International Automotive Engineering Congress, Detroit, Mich., Jan. 8-12, 1973, Paper 730214.)

Swirl-chamber and direct-injection diesel engines and their ability to control hydrocarbon and nitrogen oxide emissions are discussed. California regulations will limit HC and NOx emissions to 5 g/bhp-hr in 1975 for engines in heavy-duty vehicles weighing over 6000 lb. By modifying the injection timing of a production engine equipped with a swirl-chamber combustion system, HC and NOx emissions can be achieved on the order of 4.0 g/bhp-hr under both naturally aspirated and turbo-charged conditions, without a significant sacrifice in smoke-limited power. Emissions of about 4.4 g/bhp-hr could be achieved with the turbo-charged direct-injection engine with the aid of aftercooling, but performance would be at a lower level than that possible with swirl-chamber engines of the same size and the same emission level. Performance characteristics of both engines are described. Results of varying injection timing, varying the start and mode of combustion, using exhaust gas recirculation, using water injection, and using pilot injection were also studied.

27001

APTIC NO. 48751

Walters, R. M.

HOW AN URBAN REFINERY MEETS AIR POLLUTION REQUIREMENTS. *Chem. Eng. Progr.*, 68(11):85-88, Nov. 1972. 3 refs.

The Philadelphia air management program and steps taken by a refinery to comply with the requirements are discussed. The development of air pollution control methods throughout the country, and survey programs determining emissions, including hydrocarbons, nitrogen oxides, particulate matter, sulfur compounds, ammonia compounds, aldehydes, and organic acids, and their sources are reviewed. Major steps taken by

CONTROL METHODS

the refinery included: equipping all storage tanks with internal or external floating roofs; a total hydrocarbon emission reduction from gasoline and crude oil storage tanks; and the installation of cyclone separators for dust removal. The installation of rupture discs, the design of a complete vapor recovery system at the loading terminal, covering oil-water separators, designing blowdown systems, the installation of oxygen analyzers or smoke alarms on all boilers and process heaters burning liquid low sulfur fuel, lowering sulfur dioxide stack emissions, and the recovery of sulfuric acid are being considered for the near future.

27002

APTIC NO. 48695

Wiesner, Rudolf

COMBATING THE SMOG. (*Kampf dem Smog*). Text in German. *Tech. Umweltmag.*, no. 6:28-29, Dec. 1972.

Since July 1, 1969 the carbon monoxide fraction in the idling emission from Otto engines may not exceed 4.5% by volume. This requirement was easy for the automobile manufacturers to fulfill through more exact adjustment of the carburetor and ignition. Since Oct. 1, 1971 the regulations concerning exhaust gas emission became considerably more stringent for all Common Market countries. The manufacturers must subject the engines to a driving test which determines the CO and hydrocarbon emissions. The so-called Europe cycle lasts 195 sec and comprises the driving conditions of idling, acceleration, cruising speed, and deceleration. An engine has to go through four such cycles. This new regulation applies to all automobiles licensed after the above date. In order to meet the new requirements, the manufacturers had to modify the engine design. The air conduct, mixture preparation and combustion process had to be improved.

27003

APTIC NO. 48814

Wilde, G. and L. Reh

REMOVAL OF FLUORINE FROM THE WASTE GASES OF THE ALUMINUM FUSION ELECTROLYSIS IN A HEAVILY EXPANDED ALUMINUM OXIDE FLUIDIZED BED. (*Fluorentfernung aus den Abgasen der Aluminium-Schmelzflusselektrolyse in stark expandierten Aluminiumoxid-Wirbelschichten*). Text in German. *Aluminium*, 48(11):738-740, 1972. 8 refs. (Presented at the Gesellschaft Deutscher Metallhuetten- und Bergleute, Stuttgart, West Germany, April 1972.)

A method is described for the binding of fluorine from waste gases of aluminum fusion electrolysis in a heavily expanded alumina fluidized bed. The method was first tested on a laboratory set-up. The fluorine polluted gas was drawn on by a fan and passed to the fluidized bed reactor. A constant quantity of oxide was also entered continuously. With gas velocities of 1-5 m/sec, a greatly expanded fluidized bed was formed which was maintained by returning the oxide carried off in the cleaned gas and retained in two cyclones and a subsequent bag filter. For an oxide throughput of 300 g/hr, a gas throughput of 108 cu m/hr, and a pressure loss of the fluidized bed of 150 mm water, the average gaseous fluorine concentration was reduced from 23.2 mg/cu m to 0.57 mg/cu m. The good collection efficiency of more than 97.5% was due to the long contact time between gas and solid phase and the intense mixing of the two phases. The satisfactory laboratory results lead to the erection of a scaled down experimental plant and eventually to a large scale plant for an aluminum manufacturing plant with an annual production capacity of 60,000 tons of aluminum and an hourly waste gas volume of one million cu m/hr. The waste gases are drawn off from the enclosed electrolysis furnaces and passed to two fluidized bed adsorbers. The cleaned gases are passed through a bag filter for recovery of the oxide and discharged through a 40 m high stack. The oxide throughput will amount to 750 kg/hr, and the pressure loss is expected to remain below 700 mm water over the entire facility from electrolysis furnace to stack exit. The gaseous fluorine concentration in the cleaned gas is below 1 mg/cu m.

27007

27004

APTIC NO. 48542

Willoughby, E. and J. Curnick

CONTROLS ODORS AT LOW COST. *Food Eng.*, 44(10):107, 110, 112, Oct. 1972.

Electrolytic cells are used to eliminate odors from two large anaerobic digesters in which milk processing and equipment washdown waste waters are treated. The cells, which consist of graphite anodes surrounded by tubular cathodes, generate the hypochlorite solution that is used to scrub the digester exhaust gases. These gases contain small amounts of ammonia and hydrogen sulfide plus methane, nitrogen, and oxygen. Overflow from the scrubber that is not recirculated is returned to the aerobic stage of the anaerobic digestion process, thereby furnishing prechlorination and odor control at that point in the process. The hypochlorite solution is also useful in controlling odors in the primary clarifier immediately ahead of the activated sludge portion of the waste treatment system. Total costs for the electrolytic cells and scrubbers were less than \$10,000/digester.

27005

APTIC NO. 48646

Winkler, Heinrich

ELECTRICAL FILTERS FOR THE PURIFICATION OF AIR AND GASEOUS EMISSIONS OCCURRING IN INDUSTRIAL PLANTS. (*Elektrofilter zum Reinigen von Luft und Abgasen in industriellen Anlagen*). Text in German. *Siemens-Z.*, 46(11):865-869, Nov. 1972. 3 refs.

Principles, uses, and some examples of the application of electrostatic precipitators are described. Electric precipitators, used e.g., in metallurgy, chemical industries, cement works, thermal power and incineration plants, and in high-quality air conditioning equipment, require voltages immediately below the breakdown voltage for maximal efficiency which reaches 99.9%. Electrostatic precipitators, though expensive, are cheaper in operation than most pollution control devices. Horizontal electrostatic dust precipitators with a unit capacity of 1,070,000 cu m/hr are used at a brown coal-fired power plant emitting waste gases with a dust content of 18.5 g/cu m. The separation efficiency is 99.85%. Another horizontal electrostatic dust precipitator, designed for an hourly throughput of 88,000 cu m of flue gas with 10 g of dust/cu m at a waste incineration plant has an efficiency of 99%.

27006

APTIC NO. 48858

Wolf, Friedrich, Wolfgang Krueger, and Helmut Fuertig

THE INFLUENCE OF THE GAS ATMOSPHERE ON THE STRUCTURE AND THE MELTING PROPERTIES OF THE ACTIVE COMPONENTS OF VANADIUM CATALYSTS FOR THE SO₂ OXIDATION. (*Der Einfluss der Gasatmosphäre auf die Struktur und das Schmelzverhalten der aktiven Komponenten von Vanadinkatalysatoren zur SO₂-Oxydation*). Text in German. *Chem. Tech. (Berlin)*, 24(12):753-757, Dec. 1972. 16 refs.

The influence of various gas atmospheres (sulfur dioxide, sulfur trioxide, nitrogen, and SO₂-oxygen-N₂ gas mixtures) on vanadium catalysts was studied by means of radiography and infrared spectroscopy. For the experiments a potassium sulfovanadate was prepared by melting 99.9% vanadium pentoxide and potassium sulfate in air with a temperature of 470°C. Apart from the component V₂O₅·2K₂SO₄, potassium polysulfate-like compounds with changing SO₃ concentrations seemed to be present. A new crystalline phase was found which contained the reduced vanadium IV. Under the influence of oxygen the sulfatized potassium sulfovanadate was transformed into a glassy amorphous state. The solidification temperature of the molten potassium sulfovanadate depended on the reduction of the five-valent vanadium.

27007

APTIC NO. 48881

Yanovskiy, L. P., Ye. I. Byalik, and Ya. I. Belkin

ELECTRIC FILTER SEDIMENTATION ELECTRODES: CONTROL OF THE SHAKE-OFF CONDITIONS.

(Upravleniye rezhimom otryakhivaniya osaditelnykh elektrodov elektrofiltrov). Text in Russian. *Energetik* (Moscow), no. 11:18-19, Nov. 1972.

The effect of shake-off intervals on electrostatic ash precipitator efficiency, and a new patented shake-off control are described. Short shake-off intervals, e.g., 3 min, are not recommended, since only a thin, loose ash layer of 100-200 micron can be removed, the bulk of which is carried away by the gas flow. Extended shake-off intervals of 2-3 hr permit the removal of agglomerated ash with considerably reduced losses. It is thus possible to reduce the residual ash concentration after the electrostatic precipitator by 25-30%. The shake-off period should be determined to prevent the ash buildup immediately before shake-off from interfering with normal operation. The shake-off interval for the first precipitator field should be chosen as a function of the initial ash concentration and of the efficiency of this field. A new speed variator, to be inserted between drive and cam or hammer shaft, permits a more uniform rate of ash removal during the shake-off period by varying the steepness of the shake-off shaft in eight steps from 1:9 to 1:70.

27008

APTIC NO. 48619

Yoshida, Banzo

AIR PURIFICATION DEVICE. (Kuki seijo sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-50702. 7p., Dec. 20, 1972. 3 refs. (Appl. Oct. 9, 1969, 1 claim).

An air filter using an endless filter cloth is described. The filter is cleaned by moving the filter by manual or automatic control into a container of wash water for removal of the accumulated dust. Then it enters a cleaner solution for regeneration. When the filter returns to the original position, the belt-drive motor stops. This cycle of cleaning is repeated at regular intervals to maintain higher cleaning efficiency.

27009

APTIC NO. 48479

Yoshikawa, Goro

PROBLEMS OF TEST METHODS FOR GAS-REMOVING FILTERS. (Gasu jokyo firuta shikenho no mondaiten). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(6): 59-61, Dec. 1972.

Pressure loss of a filter during gas removal can be determined at a specific flow rate. The initial gas removal efficiency is measured 30 min after the test gas begins to flow. Gas adsorption capacity is the volume of the test gas adsorbed during the period in which the gas removal efficiency drops to 85% of the initial efficiency. Test gases include sulfur dioxide, carbon monoxide, and hydrogen sulfide. The rosanile, conductometric, and continuous methods can be used to measure SO₂; methylene blue can be used to measure H₂S; and infrared spectrometry can be used to measure CO. Gas chromatography is being considered as an analytical method. The test gas must be uniform through the test period and the air to be mixed with it must be pure. When a large-capacity gas removal device is tested, the quantity of test gas used can be sizeable. A large disposal device is therefore needed for the test gas. A major problem of testing gas removal filters is that it can take a month to complete one performance test.

27010

APTIC NO. 48573

Zenz, F. A.

DESIGNING GAS-ABSORPTION TOWERS. *Chem. Eng.*, 79(25):120-138, Nov. 13, 1972. 15 refs.

Good gas absorption depends on intimately contacting a gas and liquid under conditions that promote solution. Attaining such contact involves maximizing the exposure of gas and liquid surfaces to each other. This can be done in one of three ways: breaking up the liquid into a multiplicity of slow-flowing films that are dispersed through a volume of gas (packed towers); breaking up the gas into little bubbles that are passed through a volume of liquid (tray towers); or breaking

up the liquid into tiny drops that are dispersed through a volume of gas (spray towers). These three major types of towers are considered with respect to design aspects such as sizing diameter and height, stage estimation and efficiency correlations, and arrangement of internal assemblies.

MEASUREMENT METHODS

1973

27011

APTIC NO. 48803

Bohnet, Matthias

DETERMINATION OF DUST CONTENT OF FLOWING GASES. (Staubgehaltsbestimmung in stromenden Gasen). Text in German. *Chem.-Ing.-Tech.*, 45(1):18-24, Jan. 1973. 12 refs. (Presented at the Jahrestreffen der Verfahrenstechnik, Cologne, West Germany, Oct. 3-5, 1972.)

Numerous techniques are employed for the determination of the dust content of flowing gases. Measurement of the absolute content of solids is almost invariably carried out by diversion and analysis of a partial current of gas. Apart from a perfect finish to the measuring probe and the choice of suitable measuring points, it is above all the removal of the partial current at the same flow rate that affects the results obtained. Removal at nonuniform velocity leads to measuring errors that increase with increasing deviation of the removal velocity from the channel velocity and with increasing particle size of the solid. The size of the error can be determined theoretically and experimentally. Following a comparison of the various methods available for determining the error in measurement, a simply used diagram is provided that can be employed for subsequent correction of measured values. In general it was found that errors from non-isokinetic sampling are frequently much lower than errors introduced by strand formation of the solid particles and by insufficient number of measuring points.

27012

APTIC NO. 48776

Buerkholz, A.

MEASURING METHODS FOR DETERMINING DROPLET SIZE. (Messmethoden zur Tropfengrossenbestimmung). Text in German. *Chem.-Ing.-Tech.*, 45(1):1-7, Jan. 1973. 27 refs. (Presented at the Jahrestreffen der Verfahrenstechnik, Cologne, West Germany, Oct. 3-5, 1972.)

The importance of droplet size determination is increasing with increasing application of liquid atomization. The measuring methods are more difficult and newer than those used in grain size determinations, and they are also less accurate. With the exception of a few special methods, one still has to resort to deposition of the droplets on a suitable surface followed by microscopic measurement in the case of falling or spraying liquids (3000 to 30 micron). In contrast, mist is accessible to measuring instruments and fractional collection: according to droplet size (cascade impactors, frit cascades, and measuring cyclones). The amounts deposited afford an approximate measure of the required droplet spectrum on the basis of a single calibration with droplets of known size. More recent optical methods measure the droplets without previous deposition. Commercially available counting equipment registers the light scattering by the individual droplets. Droplet holography affords an instantaneous record of a cloud of droplets. Subsequent three-dimensional reproduction permits measurement and counting of the droplets. Drop size determinations are important factors in removing droplets from waste gases.

MEASUREMENT METHODS

27018

27013

APTIC NO. 49017

Dietz, Russell N., Jacob Pruzansky, and James D. Smith

EFFECT OF PH ON THE STOICHIOMETRY OF THE IODIMETRIC DETERMINATION OF OZONE. *Anal. Chem.*, 45(2):402-404, Feb. 1973. 6 refs.

The stoichiometry of the ozone-iodide reaction using potassium iodide solutions at pH 4-14 for ozone concentrations of 50-600 ppm and for sub-ppm O₃ concentrations using neutral KI was determined. Experimental apparatus included a flowmeter, an impinger, and photometric and spectrophotometric analyzers. The flow system, analyzer calibration, and analytical techniques are reviewed. The stoichiometry of the O₃-I₂ reaction near neutral pH was established at 1.00 ± 0.03 and quantitative (within experimental error) at concentrations as low as 0.1 ppm and at flows as high as 2.5 l/min through a midjet impinger. (Author conclusions modified)

27014

APTIC NO. 48826

Killingmo, Odd-Hroar

CONTINUOUS MONITORING OF WASTE GASES.

(Kontinuierliche Messverfahren fuer Abgase). Text in German. *Chem. Ing.-Tech.*, 45(1):36-41, Jan. 1973. (Presented at the Dechema-Jahrestagung, Frankfurt, West Germany, June 15-16, 1972.)

Monitoring of stack gases places special demands on the location of sampling points in order to achieve a satisfactorily representative picture of the nature and amount of atmospheric pollution. The choice of analytical method must take account of local conditions, the concentration, nature, and composition of the pollutants, and the flow conditions in the stack. Among other factors, the nature of the pollutant, interfering components in the waste gases, the desired accuracy of measurement, the measuring range of the instrument, operational reliability, and economics all play a role in determining the choice of instrument. Various continuously registering analyzers were tested under practical conditions and the values obtained compared with those recorded manually. The experiments were carried out in a stack with a diameter of 1200 mm. The waste gas from a mill for grinding limestone which was first cleaned in a bag filter was discharged through this stack. The particle concentration in the gas flow was measured with a smoke density meter, an optical instrument with flow tube, and a beta-radiation meter. The manual measurements were taken with a Pitot-tube at 20 points over the measurement cross section and by isokinetic sampling at 10 points. With increasing particle concentration, the variation of the measurement results rose. The smoke density meter and the manual measurements produced very deviating results. With higher particle concentrations, the smoke density meter produced lower values than the manual measurements. The optical measurements with the flow tube yielded at low particle concentrations approximately the same results as the manual measurements. With higher particle concentrations, the flow tube produced lower values than the manual method. The agreement of the results with the beta-radiation meter with those of the manual method was better than with the first two methods. At high particle concentrations the beta-radiation meter produced higher values than the manual measurements.

27015

APTIC NO. 48787

Leschonski, Kurt

CHARACTERIZATION OF DISPERSED SYSTEMS, PARTICLE SIZE ANALYSIS. (Kennzeichnung disperser Systeme, Teilchengroessenanalyse). Text in German. *Chem.-Ing.-Tech.*, 45(1):8-18, Jan. 1973. 67 refs. (Presented at the Jahrestreffen der Verfahrens-Ingenieure, Cologne, West Germany, Oct. 3-5, 1972.)

An introduction and a survey of the principles and measurements involved in particle size analysis are given. Particular attention is directed towards provision of a brief account of the great variety of measuring methods, which can prove confusing

even for the experienced engineer, although more recent but not generally available techniques have been largely left unconsidered. An insight into special fields of particle size analysis is facilitated by a comprehensive bibliography. The sedimentation analysis including the various methods of quantity measurement (e.g., incremental methods with the pipette and the photosedimentometer, and the cumulative method measuring the sedimented solid particles from a suspension column in dependence of time) fractionalization by sieves, air sifters, and the direct and indirect counting methods are described.

1972

27016

APTIC NO. 48558

MONITORING GAUGES FOR BOILER FLUE GAS CONCENTRATION MEASUREMENTS. (Boira haiei nodo no kanshi keiki ni tsuite). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 8(11):1113-1115, Nov. 1972.

A KD-type dust monitor avoids measuring error, eliminates the use of a glass plate as a separator, and combines a cushion chamber and orifice. The dust which infiltrates by reverse diffusion is diluted in the cushion chamber. Since the dimension of the orifice is extremely small compared with the inner wall of the cushion chamber, only a little dust adheres to the inner wall. The cushion chamber absorbs the shock wave when the burner is fired and prevents dust from entering the light chambers. The cushion chamber must be overhauled annually to remove any dust. The light projector and receiver are attached inside the flue duct, facing each other, and a beam of light is projected by the projector into the receiver. The light volume received diminishes in proportion to the smoke density so that the density can be indicated by a meter. The KD monitor can be used to issue a warning when the needle goes beyond a certain point. The scales correspond to Ringelmann numbers if divided by 20.

27017

APTIC NO. 48771

DETERMINATION OF THE GERM CONCENTRATION OF THE AIR. MEMBRANE FILTER METHOD. (Bestimmung des Luftkeimgehaltes. Membranfiltermethode). Text in German. *Verpackungs-rundschau*, 23(12):96-99, 1972.

The membrane filter method for determination of the germ concentration in air is described. The air which is to be examined is drawn through a gelatin membrane filter at a rate of 600 l/hr. At least two samples must be taken. The pore size of the membrane filter must be 3 micron measured according to the mercury intrusion method. The diameter of the filter must be 50 mm. After exposure, the prepared membrane filter is placed into a Petri dish with Sabouraud-agar and incubated for 72 hr at 25 C. After incubation the germs can be counted.

27018

APTIC NO. 48916

American Industrial Hygiene Assoc., Analytical Chemistry Committee

ABSTRACTS OF INTERSOCIETY COMMITTEE METHODS FOR AMBIENT AIR SAMPLING AND ANALYSIS: REPORT 1. *Am. Ind. Hyg. Assoc. J.*, 33(4):269-278, April 1972. 13 refs.

Tentative methods for air sampling and analysis of various pollutants are presented including references, method of collection, principle of analysis, interferences, sensitivity, and reagents and equipment needed. Particulates containing arsenic can be collected on membrane or glass fiber filters and analyzed by colorimetry with a spectrophotometer. Gaseous chlorides are collected by frittered glass absorbers or impingers; particulate chloride is collected by filtration, impingement, or electrostatic precipitation. Chloride can then be analyzed by titration with mercuric nitrate solution using diphenyl carbazone-bromophenol blue as the indicator.

Fluorides can be collected by dry collectors such as membrane or fiber filters or by wet collectors such as dilute alkaline solution or distilled water. Then fluorides can be manually determined by direct titration or spectrophotometry. The semiautomatic method relies on colorimetry. Three collection methods are used for nitrogen dioxide -- bubbler, glass syringe, and evacuated bottle methods; NO₂ is analyzed by spectrophotometry or colorimetry using azo dyes. Total nitrogen oxides can be collected in flasks or bottles and determined by oxidation to nitrate which is reacted to phenoldisulfonic acid and by measuring the light absorption of the product. Bags are used to collect oxidants such as ozone which are determined by iodimetry. Grab samples of hydrocarbons can be analyzed by gas chromatography using a flame ionization detector and a chromatographic column. Polynuclear hydrocarbons, collected on glass fiber filters using a high-volume air sampler, are analyzed by benzene extraction and column chromatography separation followed by spectrophotometry or by cyclohexane extraction and column chromatographic separation followed by spectrophotometric and fluorimetric analysis. Benzo(a)pyrene analysis consists of collection on a hi-vol, micro-, or membrane filter and analysis by microanalysis with a spectrophotofluorimeter or a filter fluorimeter, by chromatographic analysis with chromatographic separation and fluorescence analysis, or by spectrophotometric analysis.

27019

APTIC NO. 48948

THE CHEMICAL INDUSTRY AND THE PROTECTION OF THE ENVIRONMENT. (*Die chemische Industrie und der Umweltschutz*). Text in German. *Chimia*, 26(12):672-673, Dec. 1972.

Air pollution prevention consideration have led three chemical plants situated in the Fricktal area of Switzerland to set up an air pollution monitoring network in a joint venture. The network is composed of nine Philips sulfur dioxide monitors and two meteorological stations with an altitude difference of 200 m for monitoring SO₂ concentrations regarded as a pollution indicator, and for forecasting meteorological conditions causing high pollution levels. The monitoring and meteorological stations are connected to a central computer for data processing. The SO₂ monitors, requiring no inspection over at least 3 months, determine the atmospheric SO₂ concentration by continuous coulometric titration using bromine. Bromine is reduced by SO₂, and the current necessary for the electrolytic production of fresh bromine is adopted as a measure of the SO₂ concentration.

27020

APTIC NO. 48986

Japan Environmental Agency

THE MEASURING METHOD OF SUSPENDED PARTICULATES. (*Fuyuryushijo busshitsu no sokutei hoho*). Text in Japanese. *Kankochō Kogaisenmon Shiryo* (Public Nuisance Gaz.), 7(4):26-44, July 1972.

Particles of smaller than 10 micron in size are considered as airborne particulates. Their concentration is measured as mg/cu m according to the environmental standard. It is required by the environmental standard that suitable dust samplers such as multi-stage or cyclone types are attached to the dust collector. The weight concentration is measured by low-volume sampling or high-volume sampling methods. Dusts can also be measured by relative concentration method. By this relative concentration method, the following requirements must be fulfilled: the relative concentration must have a linear relationship with weight concentration; concentrations at the range of 0.01-5.00 mg/cu m must be measurable without a switch of sensitivity; constant relative sensitivity of the apparatus can be obtained by routine inspection; relative concentration and weight concentration must be measurable when simultaneous measurement with a weight concentration measuring apparatus is carried out.

AIR POLLUTION ABSTRACTS, MAY 1973

27021

APTIC NO. 48987

RECORDS OF 10TH AREA LIAISON COMMITTEE MEETING. (*Dai 10-kai chūki renraku iinkai kiroku*). Text in Japanese. *Taiki Osen Nyusu* (Air Pollution News), no. 73:2-29, Nov. 1972.

Discussions are given on the measurements of nitrogen oxides and airborne particulate concentrations, as well as the effect of NO_x on humans. As the standard methods, the Saltzman method for the measurement of NO_x and the neutral potassium iodide method for the measurement of photochemical oxidants are recommended. Experiments on animals have shown that nitrogen dioxide causes edema of lungs, pulmonary emphysema, and asthma. The environmental standard of nitrogen oxide was set at an average concentration of 0.02 ppm for 24 consecutive hours. This is considered to be un-harmful to humans. Particulates of smaller than 10 micron in size are considered to be harmful to human lungs and are the subject of most of the studies of dust in air. Particulates are usually collected on a filter using a high volume sampler and are measured as weight per unit volume of air.

27022

APTIC NO. 49003

SULFUR RECOVERY LOOP CLOSED WITH PHOTOMETRIC RATIO ANALYZER. *Oil Gas J.*, 70(46):142-144, Nov. 13, 1972.

A photometric analyzer system for continuous monitoring and automatic control of the hydrogen sulfide/sulfur dioxide ratio in the Claus process tail-gas stream at a sulfur recovery plant is discussed. The system uses two split-beam, ultraviolet photometric analyzers with computation hardware to provide a ratio signal. One photometric analyzer measures the SO₂ concentration using a wavelength of 280 nm and a reference of 365 nm. There is no interference from H₂S at these wavelengths. The second analyzer, with a measuring wavelength of 228 nm and a reference of 361 nm, responds to the H₂S. The H₂S concentration can be obtained from a computation using the signals from each analyzer. The advantages of the new system are discussed.

27023

APTIC NO. 48947

Bakhanova, R. A. and L. V. Ivanchenko

THE EXPERIMENTAL INVESTIGATION OF THE DEPENDENCE OF THE VALUE OF LIGHT SCATTERED FLUX ON THE DROP SIZE IN AEROSOL PHOTOELECTRIC COUNTER (*Ekspperimentalnoye issledovaniye zavisimosti velichiny rasseyannogo svetovogo potoka ot razmera kapli v aerolnom fotoelektricheskom schetchike*). Text in Russian. *Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana*, 8(10):1104-1107, Oct. 1972. 3 refs.

The dependence of scattered light flux on the droplet size in aerosol photoelectric counter was studied. The use of continuous-spectrum light source does not eliminate the characteristic features of scattered light as described by the Mie theory. Consequently, the calibration curve for counters recording scattered light at small angle has an ambiguity range, and the pulse amplitude is a function not only of radius but also of the refractive index of the droplets. Counters which record scattered light at an angle of 90 deg have linear calibration curves on a bilogarithmic scale.

27024

APTIC NO. 48679

Bartlett, J. T. and R. J. Adams

DEVELOPMENT OF A HOLOGRAPHIC TECHNIQUE FOR SAMPLING PARTICLES IN MOVING AEROSOLS. *Microscope*, 20(4):375-384, Oct. 1972. 19 refs. (Presented at INTER/MICRO-71, London, England.)

Holographic microscopy for sampling particles in moving aerosols is discussed. The application of the technique to fast moving aerosols and a method of achieving a large sample volume in each hologram is described. The conditions which are necessary to produce an image in which small particles can

MEASUREMENT METHODS

27031

be satisfactorily resolved are discussed. An outline is given of an optical filtering technique which can be applied to the image to facilitate the determination of sizes of the particles in the original aerosol. A Q-switched pulsed ruby laser incorporating a suitable mode selector was used to holographically record the particles in an aerosol of up to 0.5 l. Sample aerosols were moving at high velocities up to 100 m/sec. Theory showed that whenever the limiting factor is the area of the diffraction pattern which is satisfactorily recorded by the photographic emulsion, the width of the edge of the image of a well-defined particle is independent of the particle size and proportional to the distance between the particle and the recording medium.

27025

APTIC NO. 48975

Belozovskiy, A. B., Ye. V. Zhuravlev, V. I. Tarasov, and Yu. V. Subbotin

A RAPID METHOD FOR THE DETERMINATION OF SMALL AMOUNTS OF MERCURY IN THE AIR. (*Ob ekspress-metode opredeleniya malykh kontsentratsiy parov rtuti v vozdukh*). Text in Russian. *Gigiena i Sanit.*, no. 11:78-79, 1972. 2 refs.

A rapid method for the determination of small mercury vapor concentrations in the air by means of a portable instrument is described. The mercury concentration is determined from the absorption by mercury vapor of 253.7 nanom-ultraviolet light which is measured in a glass cuvette by means of vacuum photoelement. The method is suitable for the determination of mercury vapors in a concentration range of 0.016-0.0022 mg/cu m, the relative error being 6-17%. Comparative measurements of mercury vapor concentrations by means of the UV-absorption method and by gamma- spectrometric determination of the radioactive mercuric oxide isotope showed good agreement.

27026

APTIC NO. 48836

Belyayev, I. I., M. I. Afanasyev, V. A. Ivanov, and V. V. Mechev

MONITORING OF THE GASEOUS PHASE FROM IMMERSSED TORCH FURNACES BY MEANS OF CHROMATOGRAPHY. (*Kromatograficheskiy kontrol sostava gazovoy fazy pechey s pogruzhenym fakelom*). Text in Russian. *Tsvetn. Metal.*, no. 5:28-30, 1972. 8 refs.

A chromatographic method is described for the periodic or continuous monitoring of the gaseous phase composed of e.g., nitrogen, oxygen, hydrogen, methane, carbon monoxide, carbon dioxide, hydrogen sulfide, sulfur dioxide, and water vapor, from immersed torch furnaces such as used for melting copper and nickel-bearing raw batches. Styrene- and divinylbenzene-based polymers are used as sorbents for the separation of SO₂, CO₂, water vapor, and H₂S. Oxygen, nitrogen, methane, and CO are isolated by means of a 5 Å molecular sieve. The flue gases to be analyzed originally have a temperature of 1300 C and a particle content of up to 200 g/cu m, while sampling should be done at 100-200 C with no particulate matter present. The particulate matter carried by the flue gas being sampled is separated by a cooled endless screw, after which further purification by ceramic filter is applied. The gross amount of the gaseous components is determined by means of two chromatographic columns under isothermal conditions, and the determination of the individual components is done against an inner reference with nitrogen, helium, or hydrogen as the carrier gas. Correction factors are applied to take differences in the sensitivity of the detectors into account.

27027

APTIC NO. 48761

Blades, A. T.

RESPONSE OF THE FLAME IONIZATION DETECTOR TO NITROGENOUS COMPOUNDS. *J. Chromatographic Sci.*, 10(11):693-695, Nov. 1972. 11 refs.

The response features of cyanogen, ammonia, nitric oxide, nitrous oxide, methane, and phosphine were determined in a conventional flame ionization detector and a flame spectrophotometer system where ion formation may be correlated with molecular emissions. The nitrile group produced ions by a different process than other organic structure. The NH₃, NO, N₂O, and PH₃ responses were much smaller. (Author abstract modified)

27028

APTIC NO. 48762

Bonczyk, P. A. and C. J. Ultee

NITRIC OXIDE DETECTION BY USE OF ZEEMAN-EFFECT AND CO LASER. *Opt. Commun.*, 6(2):196-198, Oct. 1972. 8 refs.

A sensitive monitoring method was developed for determining ppm concentrations of nitric oxide mixed with other gases. Detection is achieved by measuring the absorption of carbon monoxide laser light by a sample of (NO + N₂) which is situated in a magnetic field. Molecular spectroscopic data is also presented. The operating principle and procedures, measurements, and results are examined.

27029

APTIC NO. 49059

Cornett, Claude Lawrence

PLUME OPACITY. *Cincinnati Univ., Ohio, Dept. of Civil Engineering, Thesis (M.S.), Cincinnati, Ohio, 1972, 168p. 50 refs.*

A single parameter K, the specific particulate volume/light extinction coefficient ratio, can be used to relate particulate properties to their resulting plume opacity. Various in-stack and passive remote sensing techniques for the measurement of apparent plume opacities are reviewed in light of this theory and basic optics, including transmissometers and optical spectrometer. Plume transmittances are multiplicative in nature. An experiment was performed in which two types of dusts, sized by Bahco analysis, were suspended in water; and the apparent K's of the dusts were measured. A mixture of both dusts was prepared, and the transmittance of the mixture was within 1% of that predicted on the basis of the proposed theory. A relationship between plume opacity and plume appearance was developed and discussed, along with a new theory about the nature of Ringelmann numbers. The relative brightness of the white portion of a Ringelmann chart, compared to the brightness of the sky, is an important variable in the relationship between plume opacity and Ringelmann number. A discussion of smoke reading schools, and their limitations, is included. The usefulness and implication of various optical emission regulations is discussed. Particulate mass concentration monitoring is also described. (Author summary modified)

27030

APTIC NO. 48567

Crowley, Joseph B.

GOOD SAMPLING SAVES MONEY. *Hydrocarbon Process.*, 51(10):164-167, Oct. 1972. 4 refs.

A well-designed environmental sampling program offers economic benefits for the refinery manager. Savings are realized through optimum design of pollution abatement devices and waste treatment facilities, in minimum hydrocarbon and chemical losses to plant sewers, and in the absence of fines due to erroneous characterization of air and water effluents. Prerequisites for accurate measurement of refinery and petrochemical plant particulate and gaseous emissions and for accurate analysis of water samples are discussed. Typical particulate and gas sampling trains are described. Preservation methods commonly used with water samples are shown. Stack sampling is discussed.

27031

APTIC NO. 48627

D Silva, Arthur P. and Velmer A. Fassel

ULTRATRACE LEVEL DETECTION OF MERCURY BY AN X-RAY EXCITED OPTICAL FLUORESCENCE

TECHNIQUE. *Anal. Chem.*, 44(12):2115-2116, Oct. 1972. 9 refs.

X-ray excited optical fluorescence of gases was used to detect ultratrace levels of mercury vapors. The intensity of Hg 2537A was greatly enhanced in an argon-1% nitrogen (molar %) gas mixture; intense emission from several molecular N₂ band systems was also observed. The fluorescent signals obtained from three different 10-ppb level (10 ng/ml) experiments indicate the reproducibility of the method. The detection limit of this technique is expected to be at the fractional ppb level, since a number of experimental variables still must be optimized. A tentative excitation mechanism is postulated.

27032

APTIC NO. 48764

Dahneke, Barton and Hermann Flachsbarth

AN AEROSOL BEAM SPECTROMETER. *Aerosol Sci.* 3(5):345-349, Sept. 1972. 6 refs. (Presented at the IRChA International Conference, 10th, Paris, France, May 1972.)

Two new aerosol beam techniques, aerosol beam focusing and aerosol beam spectrometry, were tested in laboratory experiments. The design, principles and variables of operation, and possible applications are reviewed. In particular, the new techniques can be used in the design of automatic measuring instruments, even providing a method for the automatic and simultaneous measurement of aerosol size distribution and chemical composition of the different size intervals. (Author abstract modified)

27033

APTIC NO. 48718

Dravnieks, Andrew

NEW METHODS AND DEVICES FOR THE MEASUREMENT OF ODORS. Preprint, 7p., 1972. 21 refs. (Presented at the International Pollution Engineering Congress, Cleveland, Ohio, Dec. 4-6, 1972, Paper 11a.)

One approach to odor measurement is analytical, based on advanced high-sensitivity instrumental methods, and limited in usefulness to problems such as estimating the efficiency of odor control devices or determining the sources of ambient odor. The other approach is purely sensory, based on measurements of human response to odors at their source and in ambient air. Odor sampling, odor test rooms, panels, olfactometers, and odor collection methods are discussed. Sensory measurements remain necessary, and newer trends are toward techniques permitting better storage and transportation of the odors, better control of odor dilution in testing, and checking the sensitivity of the panelists. There is also increasing realization that simpler tests do not measure the real detectability of an odor but may be correlated to it.

27034

APTIC NO. 48722

Farmer, W. M.

MEASUREMENT OF PARTICLE SIZE, NUMBER DENSITY, AND VELOCITY USING A LASER INTERFEROMETER. *Appl. Opt.*, 11(11):2603-2612, Nov. 1972. 19 refs.

A method was developed for determining particle size, number density, and velocity using a laser interferometer. It is analyzed analytically. Signal dependence on the Mie scatter cross section, determination of particle parameters from signal visibility, system correction and calibration, and limitations and sources of error are examined. When the fringe spacing is much greater than the average particle diameter, number density can be measured; when the fringe spacing is comparable to a particle diameter, size can be estimated. The effects of particle size on the velocimeter signal are also considered. (Author abstract modified)

27035

APTIC NO. 48749

Fujii, Toru, Yoshinori Nishikawa, Yoshio Tsujino, Shigeo Nakagishi, Takashi Nakadoi, Michio Nakano, Yasuhiro

AIR POLLUTION ABSTRACTS, MAY 1973

Hayashi, Yosuke Kanishi, Takamitsu Fujiwara, and Shinji Nakatani

STUDIES ON THE EFFECTS OF NITROGEN OXIDES ON THE OXIDANT METER BY THE NEUTRALIZED KI METHOD. (*Chusei kansho KI ho ni yoru oxidant sokuteiki ni taisuru chisso sankabutsu no eikyo*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 264. (Nov. 7-9, Paper 218.)

The potassium iodide colorimetry measurement of oxidant includes the meter's response to nitrogen oxides in the atmosphere. The correction index for NO_x the oxidant meter was examined. Using the permeation method, the response of an oxidant meter to nitrogen dioxide was examined by supplying a given amount of NO₂. The average of the oxidant meter response rate was 0.207. The nitric oxide oxidation rate averaged from 13 tests was 96.9%, and therefore, 0.207 multiplied by 0.969 was 0.201. Field tests at three monitoring stations were conducted and the correlation between the measurements of NO, NO₂ and those of oxidants was obtained. The NO_x correction index obtained, the lab experiments and the index obtained from the field test were approximately the same. The NO_x correction index may be considered about 0.2.

27036

APTIC NO. 48742

Fukaya, Yasuhiro, and Yasuo Namikawa

DETERMINATION OF SULFATE CONTAINED IN THE DUST FROM OIL-FIRED BOILER - THE APPLICATION OF THE ARSENazo III METHOD. (*Juyu nensho boira baijin chu no ryusan bun no sokutei - arusenazo III-ho no oyo*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 270. (Nov. 7-9, Paper 224.)

For prevention of acid smut, ammonia gas is poured into a flue, creating sulfuric acid-ammonia salt. The quantity of ammonia is determined by analyzing the ratio of sulfuric acid and ammonia in the dusts. Previously, this was determined by a positive ion exchange resin tube. In this experiment, the arsenazo III sulfate ion measurement method was tried and examined in order to save time and eliminate the need for collecting a large quantity of dust in order to reach high concentration of sulfuric acid. A direct analysis is not possible, since the sulfuric acid ion, sulfate ion, and ions of metals such as iron and vanadium coexist in the dusts. Therefore, a standard test material with known compositions and the material obtained at an actual plant were compared. For preventing the interference of metal ions, acetylacetone of 1/10 the quantity of the test material was best. PH adjustment was not necessary, and the yellow coloration due to certain metal ions could be corrected by extracting it by the same amount of nitrobenzene. When compared to the previous method of neutralizer titration, the test using this method using the actual plant samplings agreed very well. The correlation ratio was -1.7%. The analysis time was shortened, and the titration concentration could be 1/5 of the amount needed for the neutralizer titration. The test material with a low concentration of sulfate could be analyzed.

27037

APTIC NO. 48654

Fukuchi, Tomoyuki

STUDY ON THE INTENSITY OF ODOR. (*Akushu no kyodo ni kansuru kenkyu*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 167. (Nov. 7-9, Paper 122.)

The adsorption concentration method of measuring odor utilizes various adsorbents, and the reverse index of test material needed to saturate a given adsorbent. However, the index figures are meaningless unless their relationship with the human olfactory sensitivity is measured. In this study, the standards were established after a number of measurements, as follows: intolerable bad odor: 10-12 or more; strong odor: 7-

MEASUREMENT METHODS

27043

8; environmental standard when the emission from a single source is 3 and when the wind velocity is less than 6 m/sec, at a distance 100 m leeway is about 0.7. This is tolerable. The threshold is approximately 0.2. The results of measurements at various locations of two fishmeal factories were as follows: the material hopper, 16.3; after the dryer before the scrubber, 17.9; after the scrubber before combustion, 16.5; after the combustion, at the exit of the stack, 2.8. At the second factory, at the material boiler, 26.4; after the dryer, 5.4; before the scrubber, 13.2; after the scrubber, 21.6; after the alkaline scrubbing, 10.2; after combustion, 1.5.

27038

APTIC NO. 48935

Giry, L., M. Chaigneau, and L. P. Ricard

COMBINED GAS CHROMATOGRAPHY AND MASS SPECTROMETRY IN THE STUDY OF PERMANENT GAS TRACERS. (*Association de la chromatographie en phase gazeuse et de la spectrométrie de masse pour la recherche de traces de gaz permanents*). Text in French. *Analisis*, 1(7):475-480, Dec. 1972. 3 refs. (Presented at the G.A.M.S., 31st Congress, June 5-9, 1972.)

Combined gas chromatographic mass spectrometric procedure for the determination of permanent gas traces in the air is described. The necessary sample volume, diluted exponentially with nitrogen, may be smaller than 1 ml. The usually applied three-way valve is replaced by a Watson-Bicmann type molecular separator composed of two stages. Helium as a carrier gas, and a column filled with Porapak Q of 0.149-0.177 m and kept at -20 °C, are applied. The chromatograms are recorded potentiometrically. The lower limit of detection is 0.2-0.02 ppm under favorable conditions, the concentration limit for spectral recording is 1 ppm. The combined gas chromatographic mass-spectrometric method was used for the identification of carbon dioxide, nitrous oxide, methane, ethane, and ethylene.

27039

APTIC NO. 48918

Gnyp, A. W., S. J. W. Price, C. C. St. Pierre, and James Steiner

PROBLEMS IN STACK SAMPLING: PART III -- THE PARTICULATE TRAIN. *Water Pollution Control (Toronto)*, 110(10):44-46, Oct. 1972.

The characteristics and limitations of the various components comprising a particulate sampling train for stack sampling are reviewed. A typical train consists of a sampling nozzle, a sampling probe, pollutant collection devices, gas metering devices, and a gas mover. The errors associated with each of the sampling steps are examined.

27040

APTIC NO. 48643

Grillot, Renee

MEASURING POLLUTION. (*Mesurer la pollution*). Text in French. *Sci. Prog. Decouverte*, no. 3449:23-29, Nov. 1972. 21 refs.

General problems and possibilities of measuring air pollutant concentrations are reviewed. Sulfur dioxide concentrations are measured by volumetric titration using sodium borate, by electrolytic titrimetry by means of potassium bromide, or through a reaction with tetrachloromercurate. Sulfur and sulfur compounds can be determined by means of flame photometry. An automatic device determines particulate matter concentrations by a reflectometric measurement of the blackening of filter paper, and SO₂ by means of a bubbler simultaneously. Nitrogen oxide concentrations can be determined by means of the Saltzman method or by a chemiluminescent procedure. Gas chromatography is suited for the determination of various carcinogenic hydrocarbons. Ozone is determined by titrimetry using potassium iodide, and by the chemiluminescent method. Various methods for the determination of dust concentrations are reviewed. Infrared spectrometry is suitable for the determination of such compounds as carbon monoxide, carbon

dioxide, nitric oxide, ammonia, methanol, carbon tetrachloride, freon, and cyclohexane.

27041

APTIC NO. 48815

Grimmer, Gernot and Heinz Boehnke

DETERMINATION OF POLYCYCLIC AROMATIC HYDROCARBONS IN AUTOMOBILE EXHAUST AND AIR POLLUTANTS BY CAPILLARY-GLC. (*Bestimmung des Gesamtgehaltes aller polycyclischen aromatischen Kohlenwasserstoffe in Luftstaub und Kraftfahrzeugabgas mit der Capillar-Gas-Chromatographie*). Text in German. *Fresenius Z. Anal. Chem.*, 261(4/5):310-314, 1972. 3 refs.

A method of enrichment and separation of polycyclic aromatic hydrocarbons (anthracene, phenanthrene, fluoranthene, pyrene, benzo(a)fluorene, benzo(b)fluorene, benzo(c)phenanthrene, benzo(c)fluorene, benzo(ghi)fluoranthene, benzo(a)anthracene, chrysene, triphenylene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(e)pyrene, perylene, dibenz(a,j)anthracene, dibenz(a,h)anthracene, benzo(ghi)perylene, anthanthrene, and coronene) by capillary gas-liquid chromatography is described. The amount of polycyclic aromatic hydrocarbons was determined by comparison of flame ionization detector signals in relation to standards. Automobile exhaust and air pollutants had different relations of benzo(a)pyrene to anthanthrene, benzo(ghi)perylene, and coronene. More than 100 air and exhaust gas samples were taken. The glass fiber filters were extracted with acetone and prepared according to an illustrated scheme. The enriched mixture of polycyclic aromatic hydrocarbons was separated into two fractions by a Sephadex LH 20 column. The separation into two fractions permitted the isothermal capillary gas chromatographic separation into individual components. In the automobile exhaust samples, 11 micrograms/cu m of benzo(a)pyrene, 3 micrograms/cu m of anthanthrene, 30 micrograms/cu m of benzo(ghi)perylene, and 6 micrograms/cu m of coronene were measured. In atmospheric dust, the benzo(a)pyrene concentration was 0.41 micrograms/cu m, the anthanthrene concentration was 0.02 micrograms/cu m, the benzo(ghi)perylene concentration was 0.32 micrograms/cu m, and the coronene concentration was 0.04 micrograms/cu m. The concentration of the individual hydrocarbons was also determined in air samples taken in a street tunnel.

27042

APTIC NO. 48829

Herrmann, Guenter

ABSORPTION CUVETTES FOR PHOTOMETRIC ROUTINE DETERMINATIONS OF GASEOUS AIR POLLUTANTS. (*Absorberkuevetten zur photometrischen Routinebestimmung gasfoermiger Luftverunreinigungen*). Text in German. *Chem. Tech. (Berlin)*, 24(12):757-760, Dec. 1972. 9 refs.

For colorimetric determination of gaseous air pollutants, primarily sulfur dioxide, a stable absorption cuvette is recommended which can be directly inserted into the spectral colorimeter Spekol. The absorption cuvette can be simultaneously used as scrubber as well as colorimeter. The cuvette has an outer diameter of 19.5 mm plus or minus 0.2 mm and a wall thickness of 1.0 mm. The bottom may be flat or round. The minimum volume is 7 ml. The accuracy is satisfactory (variation coefficient of 2 to 3%) so that routine analyses can be rapidly carried out.

27043

APTIC NO. 48606

Hirai, Yoshiaki, Rokuro Tagawa, and Sadao Ueki

PROBLEMS CONCERNING EQUIPMENT IN CHEMILUMINESCENCE METHOD FOR MEASURING NOX. (*NOx sokutei no kemirunessensu ho no sochijo no mondaiten*). Text in Japanese. *Jidosha Gijutsu (Automobile Eng.)*, 26(10):1192-1197, Oct. 1972.

The chemiluminescent method can be used to analyze carbon monoxide, sulfur dioxide, ammonia, and nitrogen oxides. To improve the present NO_x measuring device, it is necessary to change it so it can be used under normal pressure. The minimum range should be 10 ppm, not the present 100 ppm, which is possible with improved photocells, reaction tank, and amplifier. If it can be used under normal pressure, the problem of making the device compact, by eliminating the vacuum pump, will be solved. The NO_x-nitric oxide conversion ratio of the converter must be improved, and interference from compounds such as ammonia gas must be eliminated. Although the NH₃ concentration and interference value (in terms of NO_x) is said to be 1:1 with the present converter, a newly developed converter has an improved ratio of 1:0.02. Temperature inside the analyzer must be maintained to prevent effects on photocells. The sampling line temperature must also be maintained to avoid temperature change in the sample and NO_x adsorption of the sample. The deadtime must be shortened and the response time improved, and the converter as compact as possible. An improved ozone generator using ultraviolet ray energy, with better efficiency, should be in use.

27044

APTIC NO. 48489

Ishiguro, Tatsukichi

METHODS OF MEASUREMENT AND EVALUATION OF ODOROUS POLLUTANTS AT SOURCES AND IN THE ENVIRONMENT. (III). (*Hasseigen ya kankyo ni okeru akushu osenshitsu no sokutei ya hyoka no shohoho*. (III). Text in Japanese. *Akushu no Kenkyu* (Odor Research J. Japan), 2(8):21-23, Oct. 1972.

The concentration of an odor can be expressed as quotient of odorous matters, Z equals C/C_t , C being the concentration of odorous matter in the gas sample, which may be in terms of mg/cu m or ppm. Both the odorous matter and sample should be under the same condition of temperature and pressure. The C_t is the target concentration to be reached by either condensation or dilution, expressed in the same unit as for C . If the concentration to be reached is the threshold, C_t is the threshold concentration. If Z is bigger than C_t , the sample must be diluted to the target concentration; Z may be called the concentration quotient of odorous matter, or simply the concentration quotient. The sample can be diluted by adding a non-odorous gas, by changing the flow rate of the sample gas, by eliminating the sample, or by condensation. However, if the odor is mixed with other matters, as in masking, if there is any chemical changes, as in oxidation into a product with some smell, or if condensation becomes abnormal because of the presence of foreign matter in the sample, the quotient cannot be measured correctly.

27045

APTIC NO. 48702

Ishikawa, N., M. Kusakabe, and M. Isozaki

A NEW NITROGEN DIOXIDE DETECTOR (I) DETECTION OF NITROGEN DIOXIDE BY CELLULOSE ACETATE FILMS MIXED WITH IODIDES. (*Nisanka chisso no kani kenchiho* (Daiippo) *Yokabutsu-sakusan seniso himaku ni yoru kenchi-ho*). Text in Japanese. *Kogyo Kogaku Kyokai-shi* (J. Ind. Explos. Soc.), 33(5):298-302, 1972.

A new method for detecting nitrogen dioxide by cellulose acetate films with mixed iodides is discussed. Cellulose acetate base film was prepared. The film was 0.15 mm thick, transparent and ductile. Its ductility depended on the quantity of iodide mixed in. Nitrogen dioxide reacted with the iodide in the film, freeing iodine whose concentration was determined colorimetrically. The film exposed to NO₂ had the maxima in its absorption spectrum at 290 and 360 micron wavelengths. Differences of optical densities of the film before and after exposures to known concentration gases lead to a calibration curve. The optical density of the film increased linearly with the concentration of NO₂. Potassium iodide, zinc iodide, and cadmium iodide were examined. Zinc iodide was the most sen-

sitive. The film was stable before exposure and had large heat resistance.

27046

APTIC NO. 48869

Katakiri, Yoshinori, Katsuhisa Fukaya, Shozo Fukui, and Saburo Sugano

DETERMINATION OF PYRIDINE IN STACK GAS (CYAN-PYRAZOLONE METHOD). (*Pirijin no hishoku teiryoho* (shian-pirazonon-ho)). Text in Japanese. *Japan Society of Air Pollution. Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 118. (Nov. 7-9, Paper 73.)

A photometric colorimetry method of measuring pyridine was established using a chlorocyan-pyrazolone mixture. Pyrazolone and chloramine solutions and phosphoric acid salt buffer are prepared. The absorbent is 0.1 sulfuric acid. The test gas is passed through the absorbent in the filter suction pipe at 1 l/min, and a given amount is taken as a test material. Ten ml of the absorbent and the pyridine standard solution are taken and 1 ml of 0.1% cyan solution is added; then neutralized by 0.1 N sodium hydroxide. The buffer and chloramine T solution are added. The pyrazolone solution is added and is left for 50 min at 50 C. Water is added, and then photometry is measured. The reaction temperature, the optimum chloramine additive, the choice absorbent and absorption efficiency, and the effects of coexistent gases were examined. The optimum amount of chloramine T was 3-5 ml; the optimum temperature was 50 C; the absorption stabilized for about 20 min after the solution was left 1-50 min at that temperature. The absorption efficiency was 100% with sulfuric acid. Nitrogen dioxide and ammonia showed no effect on the measurement, but sulfur dioxide and trimethylamine interfered with the measurement. The SO₂ could be eliminated by passing the test material through a layer of sodium hydroxide; but there was no way of eliminating the effect of trimethylamine.

27047

APTIC NO. 48499

Kimoto, Toshio

CPS SAMPLER FOR HIGH VOLUME. (*Fuyu ryushijo busshitsu no ryukei bunpu sokuteiki*). Text in Japanese. *Japan Society of Air Pollution. Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 106. (Nov. 7-9, Paper 61.)

A cascade particulate separator for high volumes was manufactured and introduced. This equipment is capable of indicating an accurate measurement of the weight of particles larger than 10 micron, the percentage they comprise in the entire distribution of suspended particulates, and the compositions of particles. The equipment is attached to a high-volume sampler that inhales the air at a speed of 566 l/min. The equipment comprises four stages with various size slits which separate .20 micron and 1 micron particles, and captures more than 99.5% of particles less than 1 micron in size in a backup filter. Particle sizes are compared with the standard size particles in a chamber. Standard particles are generated by a generator manufactured in England or in the United States. Standard particles themselves have a certain distribution pattern, and therefore, their characteristics are examined before the comparison.

27048

APTIC NO. 48530

Knutson, Donald M.

CYLINDRICAL RODS: MORE EFFICIENT SPORE SAMPLERS. *Plant Disease Repr.*, 56(8):719-720, Aug. 1972. 2 refs.

Spore traps made of cylindrical rods wrapped with a polyethylene square coated with Dow-Corning 200 fluid have a higher trapping efficiency (150% or more) than flat microscopic slides coated with adhesive. When not exposed, each trap is stored individually in a large test tube. Other advantages include ease of preparation and lack of microbial growth on the silicone. (Author abstract)

27049

APTIC NO. 48621

Leichnitz, Kurt

DETERMINATION OF SMALL SO₂ CONCENTRATIONS WITH TEST TUBES. (*Bestimmung geringer SO₂-Konzentrationen mit Prüfrohrchen*). Text in German. Draeger-Hefte, no. 290:1-4, Oct.-Dec. 1972 6 refs.

A new Draeger test tube is described which can be used for determination of small sulfur dioxide concentrations in the atmospheric air. The standard measurement range extends from 0.1 to 3 ppm SO₂. The gas sampling pump draws on 10 l of air. The test tubes operate within a temperature range of 10 to 30 °C. The test tube contains the reagents dinatrium-tetrachloromercurate and methyl red. The developing hydrogen chloride changes the yellow color of the indicator to red, with methyl red is the acid indicator. The interference by other gases such as hydrogen chloride, chlorine, nitrogen dioxide, ammonia, and hydrogen sulfide is relatively minor.

27050

APTIC NO. 48472

Lucas, D. H.

THE OBJECTIVE CALIBRATION AND AIR POLLUTION SIGNIFICANCE OF RINGELMANN NUMBERS. *Atmos. Environ.*, 6(10):775-780, Oct. 1972. 2 refs.

Ringelmann numbers are used extensively in the control of visible emissions from chimneys. The implications of this method of control and the standardization of the Ringelmann chart are discussed. Optical effects of particles and in the plume, limitation of quantity and quality of flue gas, and ground level effects are considered. If chimney plumes comply with a fixed Ringelmann number (S), each source is allowed an area of visible plume proportional to the size of the installation; single plumes will not usually be visible along a transverse horizontal line at ground level at (S) equals 2; when many plumes are present, the contribution of large installations to the reduction of ground level visibility is less than proportional to their size; and a higher emission velocity makes the fixed Ringelmann number (S) slightly less stringent for a given installation. (Author conclusions modified)

27051

APTIC NO. 48863

Mamuro, Tetsuo, Yatsuka Matsuda, Akita Mizohata, Takayuki Takeuchi, and Akira Fujita

INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS OF ENVIRONMENTAL POLLUTION. (*Kankyo osen busshitsu no kiki bunsekiteki hoshaka bunseki*). Text in Japanese. In: *Hoshasen no riyo suru genso bunsekiho ni yoru kankyo osen no kenkyu*. (Studies on Environmental Pollution using the Radioactive analyses of elements). p. 493-495, Oct. 1972. 13 refs.

Dusts contained in approximately 120 cu m of air were collected on a membrane filter 4.7 cm in diameter and 1.2 micron in size, continuously at a rate of 10-20 l/min during a period of 1 month. The dusts were irradiated with hot neutron flux 2 times 10 to the 13th power n/sq cm/sec and high speed neutron flux 3 times 10 to the 12th power n/sq cm/sec for 5 min and for 1 hr. The sample irradiated for 5 min was cooled for 2 min and 15 min, and then analyzed. The sample irradiated for 1 hr was cooled for 2-3 days, 6-7 days, and 15 days and then analyzed. Thirty-six elements including metals and halogens contained in the air collected from four locations in Osaka were determined by the above method. The seasonal variations of selenium and bromine are presented in a graph.

27052

APTIC NO. 48750

Maugh, Thomas H., II

AIR POLLUTION INSTRUMENTATION (II): THE GLAMOUR OF LASERS. *Science*, 177(4054):1090-1093, Sept. 22, 1972. 5 refs.

Research in laser spectrometry and refinements in correlation and Fourier transform spectroscopy (interferometry) are

reviewed. Correlation spectrometers are highly specific, small, and very portable. Measurements can be made not only from fixed locations but also from moving vehicles and airplanes. Their chief disadvantages are cost and the inability of most instruments to measure more than one or two pollutants at a time. Fourier transform spectroscopy with a Michelson interferometer provides the greatest degree of optical efficiency and the greatest amount of spectral information. Measurements with correlation interferometers can be made in a variety of ways. Vertical measurements of pollutant concentration can be made from an airplane with the earth's thermal radiation as a source. Long-path monitoring of pollutants in urban areas can be accomplished over distances of 6000 m with a high-temperature, broad-band infrared source. Exhaust gases from industrial facilities can be monitored with use of the self-emission of the heated pollutants. One potential application of the interferometers is in city or statewide monitoring systems. Three areas of current laser research are Raman scattering, resonance Raman scattering and fluorescence, and resonance absorption. A prototype laser based on resonance absorption can detect 10 gaseous pollutants at concentrations of a few ppb. However, only one pollutant can be measured at a time, and the instrument can not be used for long-path monitoring. An infrared laser atmospheric monitoring system (ILAMS) based on spectral scanning is capable of long-path monitoring. The current system can detect 14 ppb ethylene and 19 ppb ammonia over a 6100-meter path with virtually no interference from rain, haze, or snow. The system can be readily modified to monitor other pollutants. Future lasers for remote or long-path monitoring may be based on a continuously tunable laser in which all wavelengths would be chosen electronically. Five promising approaches to the tunable laser are discussed.

27053

APTIC NO. 48704

McNerney, John J., Peter R. Buseck, and Roland C. Hanson

MERCURY DETECTION BY MEANS OF THIN GOLD FILM. *Science*, 178(4061):611-612, Nov. 10, 1972. 11 refs.

An instrument was developed for the detection of mercury based on the adsorption of elemental mercury vapor on a thin gold film and measurement of the resulting resistance changes in the film. The instrument is rapid, simple, and portable; requires no chemical separations other than passage of the vapor sample through a few standard dry filters; and is directly applicable to environmental problems and geochemical prospecting. The limit of detection of the prototype instrument is 0.05 mg Hg. The method was also sensitive for hydrogen sulfide, but showed only minimal response to sulfur dioxide, methane, and carbon monoxide. The instrumentation, laboratory procedures, and test results are defined. (Author abstract modified)

27054

APTIC NO. 48494

Murozumi, Masayo

A METHOD OF ISOTOPE DILUTION, SURFACE IONIZATION MASS SPECTROMETRIC ANALYSIS FOR LEAD-EXAMPLE OF MEASUREMENT OF LEAD IN THE AIR OF A CITY. (*Namari no doitaikishaku, hyomen denri shitsuryo bunseki ho - Toshi kuki chu namari no sokutei rei*). Text in Japanese. *Bunseki Kiki* (Anal. Instr.), 10(12):791-797, Dec. 1972. 7 refs.

An example lead analysis in the air of the city of Muroran in Hokkaido by the lead isotope dilution mass spectrometric method is stated. The sampling was made for about 5 hours at a 3.5 cu m air filtering rate through a Millepore filter on days when the wind blew from the Pacific Ocean. The mass spectrometer used was the improved RMU b type with an ion source variable from 3600 to 12,000 V, a 300 resolving power, a 10 ohm high resistance, and an electron multiplier of 5000 multiplying rates. The lead in the sample was converted into lead sulfide, and 1 microgram of the PbS was loaded on the center of the single filament of the ion source section of the

mass spectrometer. The lead plus ion emitted from the PbS by application of electricity to the filament is accelerated at an electric field and dispersed into the mass spectrum. Then each of the intensities is amplified by the electric multiplier or the Faraday cup to put on record, from which 208 Pb/206 Pb is obtained. The accuracy of this analytical method was far higher than any other method, and the sensibility to lead was 10 to the minus 11th power micrograms. It was possible to analyze lead of .003 micrograms levels, but the speediness of the analysis was inferior to the others.

27055

APTIC NO. 48860

Novikova, I. S., I. V. Pervukhina, L. A. Slonova, and I. K. Ryzhova

A PROCEDURE FOR THE DETERMINATION OF CARBON DIOXIDE IN THE AIR BY MEANS OF CHROMATOGRAPHY. (*Khromatograficheskii metod opredeleniya dvuokisi ugleroda v vozdukhie*). Text in Russian. *Gigiena i Sanit.*, no. 11:77-78, 1972.

A gas chromatographic method for the determination of carbon dioxide concentrations in atmosphere and in non-industrial locals with CO₂ concentrations of up to 0.1% is described. Silicagel of 0.2-0.25 mm and with large pores as the sorbent, and helium as the carrier gas were best for the determination, the column temperature was 35 C. The helium flow rate was 40 ml/min. Heat conduction detector and absolute calibration were applied. One analysis takes 6-7 min. The gas chromatographic method has the advantages over the titrimetric technique of being highly sensitive and selective. The gas samples can be stored for 4-5 days before determination.

27056

APTIC NO. 48673

Odaira, Toshio, Kunihiro Asakuno, Toshio Izumigawa, Masaki, Mori, Hiroyoshi Morita, and Jinkichi Miyai

A STUDY ON THE FORMALDEHYDE ANALYZER BY THE ACETYL ACETONE METHOD. (*Asechiru aseton-ho ni yoru horumuarudehido kei no bogai ni tsuite*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 121. (Nov. 7-9, Paper 76.)

The principle of the acetyl acetone method of measuring formaldehyde depends on the yellow coloration of acetyl acetone liquid when encountering formaldehyde. When heated, the coloration is quickened. The light absorption is measured and the formaldehyde concentration is automatically recorded. In order to evaluate this apparatus, the chromotrope acid selected method manual analysis was used for comparison. The measurements were taken under the interferences of atmospheric gases such as sulfur dioxide, nitric oxide, nitrogen dioxide, ozone, acetaldehyde, propionaldehyde, and acrolein. In the presence of these gases, the formaldehyde indexes were 0.0 pphm, 0.1, 0.8, 0.4, 3.8, 1.0, and 6.5 pphm respectively. The maximum interference was given by NO₂ of 28 pphm, in which case the rate of interference was 2.86%. No great interference was caused by any gas.

27057

APTIC NO. 48511

Okita, Toshikazu, Masaki Mori, and Horoto Nakashima

DETERMINATION OF NITRIC OXIDE BY THE CHEMILUMINESCENCE METHOD. (*Kemirumi ho ni yoru taiki chu NO kei no shisaku*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 262. (Nov. 7-9, Paper 216.)

A trial apparatus for measuring nitric oxide in the air was constructed which achieves continuous monitoring by the chemiluminescence method. To improve the durability of the apparatus and to abate the noise, the vacuum exhaust system was not used; a sufficient sensitivity to nitric oxide and oxygen was obtained at a normal temperature. Good lineation and dependability were also obtained. To improve the stability, a rotating sector was installed between the light amplifier and

the reactor and chopped the chemiluminescence and amplified the signals from the amplifier. Thus, the noise was abated without the need for cooling the light amplifier; the drifting of the meter was reduced. The measurement ranges were 0 to 0.5, 0 to 1.0, and 0 to 5 ppm.

27058

APTIC NO. 48512

Okita, Toshikazu, Maki Inugami, Masaki Mori, and Hiroto Nakashima

CALIBRATION AND MEASUREMENT OF A CHEMILUMINESCENT ATMOSPHERIC NO RECORDER.

(*Kemirumi ho ni yoru taiki chu NO kei no kentei oyobi sokutei*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 257. (Nov. 7-9, Paper 211.)

A chemiluminescent atmospheric nitric oxide recorder was calibrated by diluting 48.5 ppm NO by highly pure nitrogen gas to 0.25, 0.5, 0.75, and 1.02 ppm. The lineation and fluctuation were examined. The results by the chemiluminescent meter (X) were compared with the measurements taken by the Saltzman NO meter (Y), and a relationship was recognized. The correlation can be expressed by the formula: Y equals 0.016 plus 1.18 X.

27059

APTIC NO. 48674

Okita, Toshiichi

MEASUREMENT OF GASEOUS AND PARTICULATE CHLORIDE IN THE ATMOSPHERE. (*Taiki-chu gasujo oyobi ryushijo enkabutsu sokutei*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 113. (Nov. 7-9, Paper 68.)

The separation measurement method of particulates and gaseous compounds (hydrogen chloride mainly) was somewhat improved. The collection rate of gas by filter paper stays at 95% at 26 l/min whether the paper is soaked in a sodium carbonate solution of 5% or of 1%. Therefore, a filter paper soaked in sodium carbonate can be used for simultaneous capturing of hydrogen fluoride and HCl. The collection rate of a millipore I.SWP 04700 filter was examined, using polystyrene particles of 0.365 micron diameter. The capturing rate was 99.9995% at 00 flow rate of 10 l/min. Sodium chloride was extracted from the filter paper using nitric acid of various concentrations; extraction was disrupted when the concentration was more than 1N. The improved method of collection and measurement is the use of two filters, one a millipore SLWP filter and the other a filter soaked in 1% sodium carbonate solution and dried. After filtering the gas for 2-4 hr at 20 l/min, the SLWP filter is soaked in scalding 0.5 N nitric acid, and the sodium carbonate filter is soaked in scalding water. Extracts are measured by the thiocyanic acid mercury method.

27060

APTIC NO. 48675

Okita, Toshiichi

MEASUREMENT OF GIANT PARTICLES IN THE ATMOSPHERE USING INERTIAL IMPACTION. (*Kansei hoshu-ho ni yoru taiki-chu kyodai ryushi no ryudo bunpu no sokutei*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 103. (Nov. 7-9, Paper 58.)

For measuring large particles of 10 to 300 micron in diameter, a simple impactor sampler was constructed. It comprises a high-volume air sampler blower, a rubber ring, and a plastic tube 6 cm in diameter. A glass slide of 6 to 8 mm is inserted perpendicularly to the air flow into the tube 10 cm from the entrance. The flow rate is 17.5 m/sec. The particles are counted by measuring a given cubic area, the number of particles collected on the slide, the slide surface area, the time, and the number of the particles in a given area is obtained by dividing the number of particles by the surface area times the time, times the air velocity times E.

27061

APTIC NO. 48727

Okita, Toshiichi, Ikuei Kifune, and Ryuichi Sugai

DETERMINATION OF BUTYRIC ACID AND ALDEHYDES USING GLASS FABRIC FILTERS. (*Roshiho ni yoru rakusan oyobi arudehido no bunsekiho no kenkyu*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 164. (Nov. 7-9, Paper 119.)

The method of measuring low-class aliphatic acids (especially n- and iso butyric acids, and aldehydes in the atmosphere using filter papers was studied. Gas chromatography and the flame ionization detector were used for the analyses. The collection rates of the acids by alkaline paper filter were examined by soaking glass fabric filters in 5% and 10% caustic soda solutions. When the flow rate was 2 l/min, a 30.3% collection rate was obtained with the 5% solution filter. With the 10% solution filter, the capturing rate was 93.2% at various flow rates. The recovery rate using the n-hexane extraction method was 100%. For formaldehyde, 5% sodium sulfite solution absorption was used first, and a 100% capturing rate was obtained when the flow rate was 1 l/min. Then filter papers were soaked in a 5% solution and a 10% solution of sodium sulfite. The capturing rate was 56% when using a 5% solution paper, and 93.4% when using a 10% solution paper, both at the flow rate of 3 l/min. When the flow rate was faster than 3 l/min, the collection rate decreased.

27062

APTIC NO. 48832

Okita, Toshiichi, Ikuei Kifune, and Ryuichi Sugai

SOME TESTS FOR THE DETERMINATION OF MALODOROUS GASES CONTAINING SULFUR AND NITROGEN BY THE FILTER METHOD. (*Roshiho ni yoru ganio, ganchisso akushu gasu bunseki no kento*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 163. (Nov. 7-9, Paper 118.)

The capturing efficiency and condensation factors of methyl mercaptan and trimethyl amine were examined by changing the flow rate and the condensation of test gases. When methyl mercaptan gas is approximately 10 ppm and the filter paper is treated by the 47 mm mercury salt, the collection rate is approximately 100% with the flow rate of 2.4 l/min. The flow rate does not affect the collection efficiency in this case. But when the concentration increases to 20-30 ppm, with the flow rates of 1, 2, 4, and 8 l/min each, the capturing rates changed to 100, 80, 70, and 60%, respectively. Therefore, when sampling methyl mercaptan by a filter paper sampler, it is desirable that the environmental concentration is less than 10 ppm, and the flow rate is 100 l/min; when the concentration is more than 10 ppm, the flow rate should be less than 50 l/min. The capturing rates of 25 ppm of trimethyl amine by a 47 mm filter paper, at a flow rate of 2, 4, and 6 l/min, were all close to 100%. A higher concentration (approximately 120 ppm) did not change the rate. The concentration of gas or the flow rates seemed to have no effect on the capturing rate when sampling trimethyl amine. Even when the concentration was as low as 1 ppb, the sampling collected at the rate of 100 l/min for 5 min yielded a 100% capturing rate.

27063

APTIC NO. 48656

Okuno, Toshihide and Masahiko Tsuji

DETERMINATION OF PCB IN STACK GAS AND IN THE ATMOSPHERE. (*Haigasu-chu oyobi taiki-chu no PCB bunseki-ho*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 109. (Nov. 7-9, Paper 64.)

After examining the efficiency of acetone, toluene, and n-hexane solvents for the gas chromatographic analysis of atmospheric PCB (polychlorinated biphenyls), the last solvent was chosen as the absorbent, for its relatively high sensitivity and clear chromatogram. The stack gas has a large quantity of

mist. A cooling apparatus was connected before the absorbent, and water was separated from the gas. This also prevented the clogging of the bubbler tip of the impinger. The low concentration PCB was captured by a hi-volume air sampler. The PCB was then extracted by an extractor using acetone as a solvent. The chlorine count of each peak of the gas chromatogram was determined, and PCBs from chlorine numbers 1 to 10 were separately measured; a calibration line was obtained for each. The scanning pattern analysis is presented by a diagram.

27064

APTIC NO. 48644

Orsos, Sandorne

DETERMINATION OF CYANIDE CONTENT IN THE ATMOSPHERE BY THE PYRAZOLONE-PYRIDINE METHOD. (*A szabad levego cianid tartalmának meghatározása pirazon-piridines módszerrel*). Text in Hungarian. *Egészsegtudomány*, vol. 16:388-391, 1972. 7 refs.

A photometric method using pyrazolone and pyridine for the determination of cyanides in ambient and workplace atmospheres is described. The necessary reagents are 1-phenyl-3-methyl-5-pyrazolone, pyridine solution with hydrochloric acid, chlorogenic solution, and bromic acid solution. The cyanogen chloride formed from cyanide in the presence of chlorine reacts with pyridine to form instable cyanopyridinium chloride. The hydrolysis of the pyridine ring results in the formation of glutacal dialdehyde which forms a colored compound with aromatic amines. The optimum duration of color development is at 15 min, after which the extinction is measured. The sensitivity of the method is 0.25 mg/11 ml sample volume. Sampling is done by means of an impinger with a glass filter in sodium hydroxide solution at a rate of 1 l/min. The sample volume, depending on the expected concentration, is 100-200 l.

27065

APTIC NO. 48513

Oshiman, Tsugukage and Kenichi Nozaki

A NITROGEN OXIDES ANALYZER FOR FLUE GASES. (*Endo haigasu chu no chisso sankabutsu sokuteiki*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 260. (Nov. 7-9, Paper 214.)

A pilot apparatus was made for measurement of nitrogen oxides in boiler flue gases. This equipment utilizes a normal pressure chemiluminescent method without the use of a vacuum pump which often causes deterioration by oil ozone. The nitrogen dioxide converter is placed in front of the detector. The flow quantity of the sample gas is regulated by a normal pressure water trap to 400 ml/min. Approximately 2.5% ozone is produced in oxygen and passed at 100 ml/min. The features of this apparatus are its quick response and high sensitivity. It gives superior results for continuous analysis of low concentrations. But measurements of actual gas are lower than true measurements due to interferences. It is necessary to use a converter which will not be affected by ammonia, hydrogen, oxygen, or combustible gases.

27066

APTIC NO. 48526

Paukert, T. T., E. J. Rosa, and L. F. Collins

PLUME OPACITY MEASUREMENTS WITH HAND-HELD SOLAR PHOTOMETER. *Chemosphere*, 1(4):169-174, July 1972.

A lightweight solar photometer provides a quick reliable assessment of plume opacity by unskilled personnel. Operation of the instrument involves the manipulation of three controls: a squeeze trigger on-off switch, a calibration-read switch, and a variable light attenuator. During calibration, the instrument is aimed directly at the sun and the variable light attenuator is adjusted to bring the meter to a full-scale (or 100% transmission) condition. The meter is scaled in both percent transmission and Ringelmann units. The device was used to measure

the opacity of a plume during the rapping cycles of an electrostatic precipitator and the opacity of refinery stack plumes. Agreement between the meter and human observers was good with no discrepancies greater than 1/2 Ringelmann. Readings from an in-stack opacity meter agreed even better with readings from the photometer.

27067

APTIC NO. 48696

Quinlan, C. W. and J. R. Kittrell

SUB-AMBIENT GAS CHROMATOGRAPHIC ANALYSIS FOR NITRIC OXIDE. *J. Chromatographic Sci.*, 10(11):691-693, Nov. 1972. 6 refs.

Nitric oxide determination in the presence of nitrogen and carbon monoxide was achieved using a dual-column single-channel gas chromatograph operated at -70 C. Nitric oxide concentrations within 100-3000 ppm were studied. The design, operation, and limitations of the instrument are reviewed.

27068

APTIC NO. 48859

Rusanov, A. A. and S. S. Yankovskiy

AN IMPACTOR WITH A BROADENED SPECTRUM OF APPLICABILITIES. (*Impaktor s rasshirennymi granitsami primenimosti*). Text in Russian. Zavodsk. Lab. (Moscow), 38(10):1289-1290, 1972. 3 refs.

An impactor with broad spectrum of applicabilities is described. The impactor is composed of six steps for inertial sedimentation and a seventh step for filtrating sedimentation. The individual cassettes are covered with fine fibrous material. When using basalt wool, the impactor can endure gas temperatures of several hundred C. The dust concentration in the gas to be tested can reach up to several tens g/cu m. The quantity of dust separated by the individual steps is limited to 60 mg.

27069

APTIC NO. 48492

Sakai, Kaoru

ANALYTICAL APPARATUS AND MEASUREMENT TECHNIQUES FOR TOXIC GASES. (1). (*Yugai gasu no bunseki sochi to sokutei gijutsu (I)*). Text in Japanese. Kankyo Sozo (Environ. Creation), 2(10):38-44, Oct. 1972.

For measuring sulfur dioxide, a sampling method using a filter and a trap, an analytical apparatus using electroconductivity, a flame photometric detector, a non-dispersive infrared gas analyzer, and gas chromatography used in combination with a flame photometric detector are explained with illustrations. For measuring hydrogen sulfide and bad odors containing sulfur, gas chromatography and flame photometry are used in combination. Fluorides and hydrogen fluoride are sampled in a sampling tube heated to 140 C to prevent condensation of test gas. A lanthanum-alizarin solution is used for analysis. A newly developed two wavelength spectrometer has a sensitivity hundred of times higher than previous analyzers. For measuring chlorine, orthotolidine colorimetry and a detector method are used according to the Japanese Industrial Standard. However, using any method, low concentrations of less than several ppm cannot be determined. For measuring hydrogen chloride, the Japanese Industrial Standard designates the thiocyanic acid secondary mercury method, the silver nitrate method, the neutralization method, and the continuous analysis method. The first is the most dependable, but is subject to the interference of halogen compounds and cyanides. Therefore, the electroconductivity method, although it does not give good repeatability, cannot be ignored.

27070

APTIC NO. 48487

Schaffrath, Horst

MEASURING INSTRUMENTS FOR DETERMINING DUSTLIKE AND GASEOUS EMISSIONS. (*Messgeraete fuer die Erfassung von staub- und gasfoermigen Emissionen*). Text in German. Silikattech., 23(8):280-283, Aug. 1972. 4 refs.

Measuring instruments designed for particulate and gaseous emission measurements in the cement and binding materials industry in East Germany are reviewed. While there are no continuously recording and optical dust concentration measuring instruments available and KONITEST instruments proved unsuitable, a discontinuously operating gravimetric instrument, model GS-1, has been developed. The instrument, to be used for gases with a dust concentration of 40 mg-300 g/cu m and with a maximum temperature of 300 C, has a sampling flow rate between 3 and 50 m/sec and two different separation stages, one high-capacity cyclone and one paper drum filter for coarse and fine fractions, respectively. Discontinuous, portable instruments designed for the concentration measurement of sulfur dioxide, sulfur trioxide, and hydrogen sulfide have a sampling rate of 30 l/hr and use a potassium chlorate solution for the absorption of SO₂ and a cadmium acetate solution for the absorption of H₂S. The SO₂ concentration is determined from the quantity of sulfuric acid formed. An iodimetric method is applied to the determination of cadmium sulfide formed from H₂S. The sulfurous emissions from cement and binding material manufacturing processes are generally small.

27071

APTIC NO. 48748

Shimamura, Kenji and Kunio Yamamoto

PROBLEMS OF MEASURING TECHNIQUES FOR EXHAUST GAS EMISSION ANALYSIS REGARDING EXHAUST GAS CONTROL IN THE USA. (*Amerika no haiki gasu kisei ni kanren suru haiki gasu sokutei bunseki no keisoku gijutsu jo no mondai*). Text in Japanese. Jidosha Gijutsu (Automobile Eng.), 26(10):1180-1186, Oct. 1972. 5 refs.

Federal and California exhaust standards for automobiles are listed for carbon monoxide, nitrogen oxides, and hydrocarbons, and measurement methods are discussed. The constant volume sampling method can be used to measure engine exhausts. Dynamometers can be used to simulate travel patterns, since road measurements are difficult. The inadequate seven-mode cycle has been replaced by Los Angeles four-mode or 1372 second-mode tests. The 1972 automobiles will be tested with a flame ionization detector for hydrocarbons; the 1973 models will be tested with a chemiluminescence method for nitrogen oxides instead of non-dispersive infrared (NDIR) analysis. The NDIR method will be used for CO, HC, and carbon dioxide measurements. Even with these improvements, errors in measurement are unavoidable due to faulty equipment, individual errors, and meteorology. Regulations concerning fuel composition are needed to reduce exhausts. Exhaust gas testing must be checked and rechecked to eliminate errors.

27072

APTIC NO. 48870

Shimizu, Makoto and Shinsuke Ishihara

AUTOMATIC MEASUREMENT OF STACK GASES. (*Hasseigen no yugai gasu nodo renzoku sokutei ni suite*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 124. (Nov. 7-9, Paper 79.)

A systematic control model for air pollution measurement is required to have various functions such as continuous measurement, speedy responses and answers, an ability to signal feedbacks to the control center, and a large range of measurements from several ppm to several hundred ppm. The 06 series which has been developed recently for air pollution emission source monitoring system meets all these requirements. The block program shows that the sampling section is adaptable for air quality measurement or flue gas sampling; the absorption section selects the optimum condition for measuring by controlling the gas flow and absorbent flow; the reaction section is reliable since it controls the reaction time and conditions; the measurement section automatically adjusts the errors by the soiling of colorimetry cells and the deterioration of the light sources; the recording section is capable of signaling back to the systems control section in various forms.

MEASUREMENT METHODS

27079

27073

APTIC NO. 48505

Sowinski, E. J. and I. H. Suffet

PROGRAMMED TEMPERATURE GAS CHROMATOGRAPHY OF BORON HYDRIDES. *Anal. Chem.*, 44(13):2237-2239, Nov. 1972. 12 refs.

The development of a programmed temperature chromatographic separation of four boron hydrides with the possible application of separating and identifying other intermediate boron hydride compounds or higher molecular weight compounds is discussed. The experimental apparatus and procedure are described. Gas chromatographic techniques used with boron hydrides, absolute column retention times for boron hydrides, and retention times for pyrolysis by-products are presented. Gas chromatographic detection limits are described at the nanogram level.

27074

APTIC NO. 48662

Steinberger, E. H. and F. Goldwater

A SENSITIVE AUTOMATIC METER FOR CONTINUOUS SAMPLING OF CONTAMINATING OXYDANTS IN THE ATMOSPHERE. *J. Phys. E.*, 5(4): 373-376, April 1972. 9 refs.

An automatic continuously recording wet chemical ozone meter was designed and tested in downtown Jerusalem. The ozone-containing air is bubbled into a potassium iodine solution. The iodine, and hence the ozone, concentration is determined by titrating the solution with sodium thiosulfate. The resulting iodine is determined by measuring the current through the cell. The current is related to ambient O₃ levels by previous calibration with a known ozone source. The random error is about 4%. The instrument was mounted at a busy intersection in Jerusalem. The diurnal oxidant pattern was that expected if the oxidants were generated mainly by photochemical reactions of automobile exhausts. The decrease of oxidants on Saturdays was very marked in August when the weekday levels were high, but even in January it was noticeably present. The high summer levels were due to high insolation and poor mixing.

27075

APTIC NO. 48630

Stoerber, Werner and Thomas T. Mercer

INFLUENCE OF CORIOLIS FORCES ON AIRFLOW IN CONIFUGES. *Environ. Sci. Technol.*, 6(13):1091-1095, Dec. 1972. 13 refs.

Due to the radial component of the airflow in the annular conical ducts of centrifugal aerosol size spectrometers known as conifuges, the Coriolis forces of the rotating airflow have a tangential component which accelerates the airflow to an angular velocity relative to the cone. For a given rotor speed, this angular motion limits the range of total airflow rates suitable for the proper operation of the instrument. The influence of the Coriolis forces was estimated earlier by employing a crude mathematical model assuming that the angular velocity of the air relative to the cone remains small compared to the rotor speed. A more adequate model was used to determine the maximum permissible Reynolds numbers of the tangential airflow in conifuges. A critical value of 9000 is suggested. (Author abstract)

27076

APTIC NO. 48690

Sugimoto, Takayoshi and Noriko Fukuie

MEASUREMENT OF PARTICULATES IN AUTOMOTIVE EXHAUST GASES. (*Jidosha haiki gasu chu no ryushi no sokutei*). Text in Japanese. *Jidosha Gijutsu* (Automobile Eng.), 26(10):1198-1205, Oct. 1972. 15 refs.

The behavior, formation, size, and emission characteristics of particulates in automotive exhaust gases are discussed in reference to developing a method of measuring these particulates. One measurement method consists of diluting exhaust gas to 8:1, trapping the gas in a bag, sucking the particulates onto a filter, and weighing the filter. The tunnel dilution and

total filter methods are mentioned. When lead is added to gasoline, about 98% of the particulates are less than 0.1 micron in diameter; with non-lead fuel this ratio is very great. However, excluding particulates less than 0.1 micron in diameter, the particulate size distribution is similar with both leaded and non-lead fuel. Non-lead fuel gives an exhaust containing many particulates larger than 0.1 micron in diameter consisting mainly of carbon. Leaded fuel emissions include particulates which float longer than non lead fuel particulates. Leaded fuels cause a greater number of particulates to form.

27077

APTIC NO. 48736

Taguchi, Katsuhisa, Toshio Tsujimoto, Takeo Takahashi, Hiroshi Kobayashi, and Yayoe Tominaga

STUDIES ON THE SIMPLE MEASUREMENT OF SULFUR OXIDES. (*Io sankabutsu no kani sokutei-ho no kento*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 126. (Nov. 7-9, Paper 81.)

A performance test was given to a simple sulfur oxides measurement apparatus devised by the Japan Scientists Council. The apparatus utilized the electroconductivity method. The standard SO_x automatic meter which uses the same principle was used for comparison of performances. When the carbon electrodes were connected with an electroconductivity meter and when conductivity was low in the area of 0 to 20 microvolts/cm, a linearity was obtained; but in the area of 20 to 120 microvolts/cm, linearity did not appear. This was obviously caused by polarization. This meter also ignored the temperature index of electroconductivity, increasing the error ratio. The gas sampler for this simplified equipment comprised an air supply pump and a reagent container. The test tube of the reagent container had a vulcanized rubber cap. It is possible that a substance that increases conductivity may dissolve from the surface of this rubber cap. The SO_x gas concentration error ratio was especially high in the lower concentration area, and the measurements were 6.2 to 7.9 times greater than those obtained from the automatic meter. The possible effects of the automatic meter's sampling filter and oxalic acid trap on the measurements were examined and found negative.

27078

APTIC NO. 48820

Takeuchi, Shigeji, Eiichi Ito, and Taiki Aoyama

MEASUREMENT OF PCB IN THE AIR. (*Taiki-chu PCB no sokutei ni tsuite*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 110. (Nov. 7-9, Paper 65.)

The feasibility of the use of hi-vol air sampler for the measurement of polychlorinated biphenyls (PCB) was examined in the industrial area in south of Nagoya. The PCB was extracted by n-hexane and measured by gas chromatography. The PCB concentration was low, but in the industrial area south of Nagoya, some pollutants of considerably high permutation were found. No PCB was detected from the 1000-2000 cu m sampling in the control area in the suburbs. Glass fiber paper filters were used and their capturing rates were examined. Various types (300 to 600) of Kanechrol were painted on the filter paper, and the gas was filtered through them at 4 to 5 l/sq cm/min. The loss rate was 1-3% for the filter with Kanechrol 300, and between 0.01 to 0.04% for Kanechrol 400, 500, and 600. The lower the chlorine permutation, the more PCB in the air will be dispersed. However, when sampling the air, the filter paper is clogged by suspended particulates or PCB particles and the loss will be limited.

27079

APTIC NO. 48883

Tanemura, Takashi and Hiroshi Suita

AIR POLLUTION ANALYSIS BY THE ENERGY DISPERSIVE X-RAY SPECTROMETRY USING RADIOISOTOPES. (*RI Sengen keiko X senho ni yoru taiki osen no bunseki*). Text in Japanese. *Radioisotop. (Tokyo)*, 21(11):641-647, Nov. 1972. 6 refs.

Aerosol samples were analyzed by energy dispersive X-ray spectrometry using radioisotopes. Aerosol samples were collected on glass fiber filters with an air sampler. Radioisotope sources, (238) plutonium and (55) iron, were used for the excitation of characteristic X-rays. The spectrometer system was equipped with a Si(Li) detector whose resolution was 198 eV for manganese K-alpha X-rays. K X-rays of sulfur, chlorine, calcium, manganese, iron, nickel, copper, zinc, and bromine, and L X-rays of lead were observed in the spectra emitted from aerosol samples. Quantitative analyses of S, Cl, Fe, Cu, and Pb were carried out. Thin polymer films containing the wanted elements were made as the reference standards for the quantitative analyses. A method for the matrix correction using characteristic X-rays emitted from the glass fiber filter was proposed. This method, which is useful for samples of medium thickness, was applied for correcting X-ray intensities of sulfur and chlorine. Atmospheric concentrations of the above elements in the aerosol samples were 0.9-5.2 mg/cu m for sulfur, 0.2-6.4 mg/cu m for chlorine, 0.6-7.0 mg/cu m for iron, 0.03-0.24 mg/cu m for copper, and 0.10-0.70 mg/cu m for lead, respectively, in Yokohama. Analytical results for Cu and Pb related to results obtained by atomic absorption for Cu and polarography for Pb. Calibration is discussed.

27080

APTIC NO. 48564

Wettig, K., R. Barich, U. Jaworski, M. Lackner, D. Marzahn, U. Schubert, and H. Wingelsdorf

THE PROBLEM OF ODOR ANNOYANCE. LITERATURE SURVEY. (Zur Problematik der Geruchsbelaestigung. Literaturstudie). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 18(12): 908-910, 1972. 17 refs.

The theories concerning odor perception, the classification of odors, and the analysis of odors are reviewed. The wave theory claims that molecules emit a radiation which is perceived by the odor receptors. The theory denies two typical properties of odors: the volatility of the substance producing the odor, and the fact that the odor can be perceived only in the presence of air. According to Dyson, three factors are important for the development of odors, volatility, solubility in fat, and intramolecular vibrations. The Moncrieff-Amoore-steriochemical theory makes volatility and the molecular configuration complementary to the receptor the key prerequisites for an odorous substance. The following classifications for odors exist: Zwaademark, Henning, and Crocker-Henderson. To date no method exists for an objective determination of odors. The subjective methods include the distance method, which measures that distance between the odor source and the sense-organ at which the odor can still be barely perceived, the evaporation method, and the surface method which determines the size of the surface which emits the odorous substance.

27081

APTIC NO. 48852

Yamada, Yasumasa, Asao Inoue, and Ken Matsuo

DETERMINATION OF AIRBORNE DUST BY X-RAY FLUORESCENT ANALYSIS. (Keiko X-sen ni yoru taiki-chu fuyu funjin no sokutei). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 83. 1 ref. (Nov. 7-9, Paper 38.)

A hi-vol sampler with glass fiber filter paper was used for sampling suspended particulates. A 5-centimeter diameter disc was cut out from the filter paper and was examined by X-ray fluorescence and atomic absorption. The evenness of the dust distribution was examined by 12 such sample discs. The fluctuation index was 3.9%. Two sample sheets were burned to ashes at a low temperature; chlorine and nitric acid was added and heated; and then lead was separated centrifugally and measured. Plots were taken and a linear correlation was found between the measurements by X-ray fluorescence and atomic absorption. Iron was also measured, and an almost linear plotting was obtained. Fifty microliters of the standard lead solution was added to the filter paper, lead sulfide was produced by sodium sulfide, and the dispersion of lead was

measured. The greater the concentration of the standard solution, the larger the diameter of the lead dispersion.

27082

APTIC NO. 48844

Yatabe, Teruo

INVESTIGATIONS OF THE MEASUREMENT OF NITROGEN DIOXIDE IN FLUE GAS. (Boira haigasachu no NO2 sokuteiho no kento). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 263. 3 refs. (Nov. 7-9, Paper 217.)

The Japanese Industrial Standards (JIS) method of measuring nitrogen oxides (the naphthalene diamine method) was examined, using flue gas from a boiler. The problems examined were whether the nitrous acid ion formation ration should be 0.5; whether the absorption rate of nitrogen dioxide is 100%; how the nitric oxide residue in the absorption jar affects the measurement; and how carbon dioxide in the flue gas affects the measurement. The absorption rate was low (20-30%) when using NO2 standard gas only, and when the ratio of NO/NO2 was higher, the actual measurement was approximately three times the calculated figure. For purging NO in the absorption jar, nitrogen is recommended. Without changing the sampling equipment and the operational procedure of the JIS, the sodium hydroxide absorbent was replaced with the Saltzman reagent. The NO2 concentration in the flue gas was obtained at the Saltzman index 0.72. When the NO/NO2 ratio was large, the measurement of NO2 was almost accurate. The use of the Saltzman reagent minimized the effects of the NO residue in the jar.

27083

APTIC NO. 48868

Yefremova, L. S., P. F. Shevchenko, E. Yu. Shaposhnikova, and E. N. Stepanov

DETERMINATION OF MICROCONCENTRATIONS OF CARBON MONOXIDE BY MEANS OF A PHOTOCOLORIMETRIC PROCEDURE. (Fotokolorimetricheskiy sposob opredeleniya mikrokontsentratsiy okisi ugleroda). Text in Russian. Gigiena i Sanit., no. 12:71-73, 1972.

A photocolormetric method for the determination of microconcentrations of carbon monoxide in the air is described. The CO is oxidized by means of iodine pentoxide at 140 C; the flow rate is 50 ml/min over 10-20 min. The iodine thus obtained is combined with dimethyl-n-phenylene diamine for coloration. The admission of CO into the bubbler is followed by an air blow over 15-30 min for the removal of the residual iodine. Photocolormetric determination is done in 10 mm-cuvette against reference concentrations. The lower limit of detection is 0.05 mg of CO per 5 ml of solution, the maximum error being 10%. Small sample volumes with prolonged air blow for high CO concentrations, and large sample volumes with reduced air blow duration help and large sample volumes with reduced air blow duration help keep the time requirement for the analysis in reasonable limits.

27084

APTIC NO. 48840

Yoshida, Koichi

MEASURING PROCEDURES OF EXHAUST GASES. (Haiki gasu no sokuteiho). Text in Japanese. Jidosha Gijutsu (Automobile Eng.), 26(9): 1059-1065, Sept. 1972. 13 refs.

Continuous analysis of automobile exhaust gases by gauges is more convenient than chemical analysis, although for microanalysis, non-continuous analysis is important also. There must be more development in microanalysis methods and devices. Exhaust sampling methods are described. Continuous measurement of exhaust can be effectively made by NDIR (non-dispersive infrared) analysis for carbon monoxide and dioxide, but for hydrocarbons and other compounds, NDIR is not necessarily ideal, although a recently improved model presents no problem for practical use. In any case it is

important to carry out a periodic check on the apparatus to maintain its precision. For HC measurement, the flame ionization detector method is used more, and for nitrogen oxides the chemiluminescence method is being used. The FID method is capable of measuring from a few ppm to 50,000 ppm, its detector capacity being linear. However, its problems are that it is influenced by flow change, and sensitivity is affected by hydrogen volume used for burner fuel and air, so that it is important to control the flow. Sensitivity to HC does not correspond to the number of carbon atoms. Sensitivity is decreased by oxygen interference, which is contained in diesel exhaust or a constant volume sample. The chemiluminescence method is better for low concentration NO_x than NDIR; is capable of measuring from a few ppm to 5000 ppm, and output is linear. Converter life is short, so that a periodic check on it must be made. Exhaust smoke is measured by the filter paper method, which measures carbon particles only. The bypass method and PHS method of letting smoke pass through a flux of light are capable of continuous measurement, contrary to the filter paper method, and are sensitive for blue smoke, white smoke, and condensed water. There are several simplified and portable CO meters, most of them based on the NDIR method or contact combustion.

AIR QUALITY MEASUREMENTS

1973

27085

APTIC NO. 48974

Tokyo Metropolitan Government (Japan), Bureau of Environmental Protection

THE RESULTS OF AN INVESTIGATION OF THE ENVIRONMENTAL POLLUTION NEAR THE INTERSECTION OF THE ENTRANCE TO ITSUKAICHI ROAD, SUGINAMI WARD. (*Suginami-ku Itsukaichi Gaido-guchi kosaten fukin kankyo chosa kekka*). Text in Japanese. 10p., Jan. 1973.

The Japanese environmental standard for carbon monoxide is that the average concentration for 8 consecutive hours must be below 20 ppm; the average concentration for 24 consecutive hours must be below 10 ppm. Regulations issued by Prime Minister also stated that the hourly average concentration for 1 mo must be below 10 ppm. Investigation of the CO concentration at Itsukaichi street in Suginami ward in Tokyo revealed that the average concentration was 11.4 ppm at the intersection 9.2 ppm at the street areas, and 6.0 ppm at areas more than 50 m separated from the street. There were 19 days during the period of investigation (Nov. 24, 1972-Dec. 22, 1972) at which the average concentration for 24 consecutive hours at the intersection exceeded 10 ppm.

1972

27086

APTIC NO. 48490

Tokyo Metropolitan Government (Japan), Dept. of Monitoring
CARBON MONOXIDE MEASUREMENT DATA AT 34 INTERSECTIONS. (*34-kosaten issanka tanso jittai chosa kekka*). Text in Japanese. 21p., Nov. 1972.

In July 1972, carbon monoxide pollution was investigated at 107 main intersections of the Tokyo metropolitan area. Thirty-four intersections in this investigation exceeded 10 ppm hour averages (from 8-hour measurements), and further investigation was planned for these areas. A 720-hour continuous measurement was taken only for six out of these 34 intersections, but investigations are to be continued in the future. The results for the six locations are presented. In addition to the 720-hour measurements, traffic quantities and lead concentration were measured for 24 hr one day a week. The measurements at all

six locations failed to pass any standards concerning traffic regulations. Three intersections exceeded the environmental standard, and one point in particular exceeded the standard on 8 days out of 30 days. Monthly averages of CO measurements at six intersections ranged from 3.6 to 7.1 ppm. In general, CO concentration was lower on Sundays, and daily peaks appeared near noon and toward evening.

27087

APTIC NO. 48495

Japan Environmental Agency, Bureau of Atmospheric Safety
SURVEY OF AIR POLLUTION CONDITIONS BY ALL-JAPAN CONTINUOUS MONITORING STATIONS. 1971. (*Showa 46-nendo zenkoku joji kanshi sokuteikyoku taiki osen jokyō no gaiyō*). Text in Japanese. 610p., Dec. 1972.

A general survey of the air pollution condition and the results of more detailed investigations are presented. Area surveys in reference to environmental standards, measurements of pollutants such as sulfur oxides, suspended particulates, nitrogen oxides, oxidant, carbon monoxide, and hydrocarbons, and measurement trends over the years are given by tables. The ratios of the cities that passed the environmental standards and those that failed in 1971 were, 145 cities or 82% passing (414 stations or 87%), and 32 cities or 18% (60 stations or 13%) failed. These figures showed a marked improvement over the conditions of 1970, when of the total 110 cities, 36% failed and 64% passed, and of 305 stations, 28% failed and 72% passed. The 32 cities that failed to meet the environment standards include Tokyo, Yokohama, Kawasaki, Chiba, Fuji, Nagoya, Yokkaichi, Kyoto, Osaka, Amagasaki, Ube, and others. However, in all areas of Tokyo, Yokohama, Kawasaki, Osaka, and Sakai, all the measurements of sulfur oxides concentration between 1965 and 1971 show a definite decrease from the total average of 0.055 ppm to 0.038 ppm. Suspended particulates also steadily decreased since 1969.

27088

APTIC NO. 48496

Ministry of International Trade and Industry (Japan)

A REPORT ON THE SURVEY OF THE ENVIRONMENTAL CONDITIONS OF THE SAKAI-NORTH IZUMI INDUSTRIAL AREA. (*Sakai-Senhoku chiku konbinato kankyo hozen chosa hokokusho*). Text in Japanese. 73p., Dec. 1972.

The annual average sulfur oxides concentration in the surrounding areas of the Sakai port showed a slight increase between 1968 and 1970, 0.025-0.027 ppm to 0.04 ppm. One of five measurements taken in 1968 failed to pass the environmental standards, and three failed in 1970. But the 1971 measurements showed much lower figures than the standards, presumably as a result of tightened regulations against the major pollution sources (22 factories) of Sakai and North Izumi. The high volume air sampler measurements of dusts at five locations showed a decreasing tendency. However, they are still over the environmental standards. The total emission quantity is slightly increasing every year, but the quantity of pollutants are expected to decrease after 1972. A large electric power industry is presently installing a dry active carbon desulfurization system for stack gases. They are advised to use lower sulfur fuel oils at the same time. A large ironwork industry has been using a low sulfur fuel oil since 1972, and it is advised to take measures against stack gases. Petroleum industries are advised to look into the collectivization of utility facilities and desulfurization systems. A program for collectivization of stacks and building of high stacks in the area has been completed by 1971, and no further plan is scheduled for the near future.

27089

APTIC NO. 48850

Ehime Prefectural Government (Japan), Inst of Public Health;
Ehime Prefectural Government (Japan), Bureau of Living

Environment; and Ehime Prefectural Government (Japan), Niihama Health Center

A REPORT ON A SURVEY OF AIR POLLUTION IN THE EHIME PREFECTURE, REPORT NO. 1. (*Ehime-ken taiki osen gaikyo hokoku, daiippo*). Text in Japanese. 68p., Feb. 1972.

Results of air pollution measurements in various areas are given. The measurements of sulfur oxides, airborne particulate, hydrogen fluoride, nitrogen oxides, and oxidants were performed by conductivity and lead dioxide, light scattering, fluoride ion activity, colorimetry, and spectrophotometric methods, respectively. The condition of sulfur oxides pollution was classified into five degrees from under 1.0 mg SO₃/day/100 sq cm PbO₂ to above 4.0 mg SO₃/day/100 sq cm PbO₂. All locations except the industrial areas showed first to second degree SO_x pollution. The SO_x concentration in the industrial area was higher than the environmental standard value, but there was a decreasing tendency. The HF concentration in an aluminum refinery area was about 0.5 ppb/mo. The particulate concentration from the major cities in this area was below average compared to the major cities in other areas.

27090

APTIC NO. 48969

Chiba Prefecture (Japan), Public Nuisance Research Inst.

A REPORT ON INVESTIGATION OF AIR POLLUTION (SULFUR OXIDES AND SUSPENDED PARTICULATES). (*Taiki osen chosa hokokusho (io sankabutsu oyobi fuyu funjin)*). Text in Japanese. 355p., Aug. 1972.

Investigations were performed at 36 stations equipped with automatic measuring apparatuses from April 1970 to March 1971. There are 50 major factories in the area including power plants which account for approximately 60% of the total discharged sulfur oxides of 9 million N cu m/mo. From April to June, there were five locations at which the SO_x concentrations were over 10 ppm at least once. The number of locations during July to Sept., Oct. to Dec., and Jan. to March were nine, nine, and five, respectively. At Suehiro junior high school, there were six times from July to Sept. that the SO_x concentration exceeded 20 ppm and lasted as long as 8 to 21 hours. Most of the high particulate concentrations were found during Oct. to Dec.

27091

APTIC NO. 48491

Dmokhovskiy, V. I., L. S. Ivlev, and A. Yu. Semova

AEROSOL MEASUREMENTS PERFORMED IN THE GROUND LAYER OF THE ATMOSPHERE IN THE KARAKUM AREA. (*Izmereniya aerolya v prizemnom sloye atmosfery v Karakumakh*). Text in Russian. Kompleks. Energ. Eksp., no. 276:109-112, 1972. 2 refs.

Aerosol concentration and size distribution measurements as influenced by different factors in the lower 15 km layer of the atmosphere in the Karakum desert were measured. Except for 0.25-0.35 micron particles, the particle size distribution function was of fairly high stability. While no vertical profile of aerosol particles below 0.2 micron was detected, the concentration of particles larger than 1 micron slightly increased with decreasing altitude. Pronounced diurnal variation of the aerosol concentration with a maximum in the evening and a minimum in the morning was observed, but the particle size distribution showed no marked diurnal variation. Chemical analyses revealed iron, calcium, zinc, and especially silicon as the main components of the dust aerosol. The washout effect for silicon was fairly weak, and increased iron, magnesium, and aluminum in the aerosol following rainfall were observed. While humidity and wind speed had little influence on the aerosol concentration, temperature and turbulence were found to be the major influencing factors.

27092

APTIC NO. 48625

Foote, Robert S.

MERCURY VAPOR CONCENTRATIONS INSIDE BUILDINGS. *Science*, 177(4048): 513-514, Aug. 11, 1972. 4 refs.

The concentrations of elemental gaseous mercury in several homes, offices, and laboratories in the Dallas area were measured. The values (ranging from 5.0-5680 ng/cu m) were substantially higher than the ambient natural background concentration, about 3 ng/cu m air in San Francisco, Dallas, and Washington, D. C. The maximum tolerable Hg inhalation level is 100 micrograms/cu m for any exposure. The Hg concentrations depended on the type of paint used, the length of time since the room was painted, and the use of mercury (laboratories, doctors and dentists offices, and broken Hg thermometers).

27093

APTIC NO. 48657

Fujie, Kimiko

ANALYSIS OF SUSPENDED PARTICULATES IN OSAKA. (*Osaka ni okeru fuyu biryushi sokutei kekka no kaiseiki*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 252. (Nov. 7-9, Paper 206.)

A hi-vol air sampler was used for measurements of suspended particulates in Osaka in 1971, and the results were compared with those of 1970. The average suspended particulate concentration was 261 micrograms/cu m in 1970 and 225 in 1971; sulfuric acid salt was 26.7 micrograms/cu m in 1970 and 22.8 in 1971; nitric acid salt was 4.90 in 1970 and 2.95 micrograms/cu m in 1971; and benzopyrene was 15.4 micrograms/1000 cu m in 1970 and 11.1 in 1971. The ratio of decrease from 1970 to 1971 was 15.6% for suspended particulates, 17% for sulfuric acid salt, 39.8% for nitric acid salt, and 27.9% for benzopyrene. The amount of suspended particulates fluctuated between 253 and 282 micrograms/cu m during weekdays, and decreased slightly to 213 on Saturdays, and dropped to 189 on Sundays.

27094

APTIC NO. 48514

Goto, Masahiro, Saburo Moriyama, Shunsaku Jikihara, and Takeo Mizui

OBSERVATIONS OF SULFUR DIOXIDE IN AMAGASAKI CITY BY THE PbO₂ METHOD. (*Amagasaki-shi ni okeru PbO₂ ho ni yoru arysan gasu sokutei kekka*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 185. (Nov. 7-9, Paper 140.)

The lead dioxide method of measuring sulfur dioxide has been used in Amagasaki city since 1960, and the number of monitoring stations increased to 32 in 1971. The medical care administration areas are determined from the measurement results of SO₂. In 1967, there were areas in the south of Amagasaki that had an average of 5 mg/100 sq cm/day, and 4 mg/100 sq cm/day SO₂. In 1971, the highest concentration was 3 mg/100 sq cm/day and the area was limited to an extremely small portion of south. Maps and a graph are presented.

27095

APTIC NO. 48791

Hamamoto, H., H. Kono, S. Hattori, and A. Kanazawa

ENVIRONMENTAL POLLUTION BY FLUORINE IN THE TOMAKOMAI DISTRICT. (*Tomakoamai-chiku ni okeru fusso no kankyo osen ni tsuite*). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):422, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

In the Tomekomai region, fluorine compounds have appeared as atmospheric pollutants since aluminum refining and phosphate fertilizer manufacturing have begun. The ocean wind, from spring through summer, causes mobile inversion

AIR QUALITY MEASUREMENTS

27100

layers and occurrences of its typical smog. Fifteen measuring spots have been set within 7 km of the source. Measurements were made the first week of every month. Average values of these spots for 1971 and curved lines representing their equivalent intensities are shown. The value within 1 km of the source is as high as 20 to 30 times the minimum value. All measured spots located NNE from the source and their year round averages are correlated. More than 91% of the polluted substances fall within 3 km of the source. Sulfur trioxide in April and fluorine in May and June had their peak values. At spots within 2 km from the source, where the fluorine concentration was over 10 micrograms/100 sq cm, plant damage occurred.

27096

APTIC NO. 48845

Kamiya, Akio, Kato Toyoo, and Hiroo Mizutani

METAL CONCENTRATION PARTICULATE SIZES IN SUSPENDED PARTICULATES IN LARGE CITIES.

(Toshi taiki-chu no ryudo betsu kinzoku sosei ni tsuite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 92. (Nov. 7-9, Paper 47.)

The Andersen type air sampler was used for the examination of the metal compositions of suspended particulates in the residential and industrial areas of Nagoya. The air was sampled for 3-7 days continuously in eight stages, at 28.3 l/min speed. The dusts were washed and nitric acid and hydrogen peroxide were added and heated. The material was then filtered, concentrated, and diluted in a small amount of chlorine solution. This test material was analyzed by the atomic absorption method and the amounts of iron, lead, steel and cadmium were measured. The ratio dusts was greater in smaller particle sizes, with the peak in the area of 1-2 micron. Near factories, the smaller the particle sizes, the greater ratios of metal elements, with the peak near 1-2 micron. In the residential areas, the smaller the particle size, the greater the ratios of lead and cadmium, but the smaller the ratio of iron.

27097

APTIC NO. 48509

Kobayashi, Isao, Masayuki Hayashi, Toshio Imai, Takashi Kajitani, Yukio Bono, Takamasa Inukai, Hiroichi Sakano, Sadanori Hiraiwa, Tadashi Takahashi, Junichiro Tsubaki, Takeo Nakagawa, and Hora Miki

RESEARCH ON AIR POLLUTION BY SULFUR DIOXIDE BY PEOPLE OF AICHI PREFECTURE. (Jumin ni yoru Aichi kenka no arisan gasu oken chosa). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 299. (Nov. 7-9, Paper 253.)

An investigation group was formed by citizens, teachers, technicians, students, and research scientists in Aichi Prefecture for an investigation of air pollution by sulfur dioxide. Alkaline filter paper was used for measurements of SO₂ in the air. Extensive pollution covering the entire Prefecture was noted, with a heavy concentration of pollution in the industrial complex south of Nagoya city. The results are presented in maps and tables. The SO₂ measurements in various districts of Nagoya ranged from 0.129 to 0.326 ppm/day/100 sq cm. In other cities of the Prefecture, the highest concentration was noted in Tokai city, 0.450 ppm, and the lowest was 0.037 ppm in Niishiro city.

27098

APTIC NO. 48812

Lippitz, Juergen

AIR POLLUTION MEASUREMENTS FROM VIENNA TO WARSAW. (Lufttest von Wien bis Warschau). Text in German. Tech. Umweltmag., no. 6: 30-32, Dec. 1972.

A mobile measuring station was equipped with an ultraviolet spectrometer (with the detection limits of 3 ppb of sulfur dioxide, 6 ppb of nitric oxide, 6 ppb of nitrogen dioxide, and 20 ppb of ozone) and an infrared analyzer for the determination

of 0-50 ppm or 0-200 ppm of carbon monoxide. An analyzer for determination of the total hydrocarbon concentration was also carried along. An integrator determined the average CO and hydrocarbon concentration since great fluctuations were caused by traffic. With this mobile station, air quality measurements were taken in Vienna, Budapest, Kattowitz, Krakow, Warsaw, Prague, Pressburg, and Bruenn. The results are listed in a table. In Vienna the 5-minute averages (taken between 8:00 and 9:20 am) for CO ranged from 8 to 10 ppm, for HC from 5 to 8 ppm, for SO₂ from 0.07 to 0.08 ppm, for NO from 0.03 to 0.015 ppm and for NO₂ from 0.06 to 0.07 ppm. In Budapest, the 5-minute average (taken between 3:20 and 5 pm) for CO ranged from 10 to 18 ppm, for HC from 5 to 15 ppm, for SO₂ from 0.04 to 0.06 ppm, for NO from 0.01 to 0.03 ppm and for NO₂ from 0.07 to 0.08 ppm. In Prague the 5-minute averages (taken between 4 and 4:30 pm) were 11 and 12 ppm for CO, 8 and 4 ppm for HC, 0.064 and 0.07 for SO₂, and 0.093 and 0.1 ppm for the oxides of nitrogen.

27099

APTIC NO. 48839

Mitani, K., M. Hoshino, H. Tsuchiya, K. Itaya, M. Kondo, and M. Ogawa

RESEARCH ON THE INFLUENCE OF AIR POLLUTANTS ON INDOOR ENVIRONMENTS (II). METALLIC COMPONENTS IN DUST DEPOSITS ON AIR FILTERS OF A CITY BUSINESS BUILDING. (Taiki oken busshitsu no shitsunai kankyo ni oyobosu eikyo ni kansuru kenkyu. (Dai 2ho). Toshi bo-biru no eyafiruta ni fuchaku shita funjin no kinzoku seibun ni tsuite). Text in Japanese. Nagoya-shi Eisei Kenkyushoho (Ann. Rept. Nagoya City Health Res. Inst.), no. 18:87-94, Oct. 1972. 17 refs.

Atomic absorption spectrophotometry was used to determine sodium, copper, magnesium, calcium, cadmium, lead, manganese, iron, nickel, and potassium from dust collected on an air filter inside a building in Nagoya in 1971. Lead concentrations from automobiles increased with a decrease in height; the annual mean concentration on the second floor was 3.005 ppm. Iron from distant industrial regions increased with increased height; the annual mean concentration on the ninth floor was 95.740 ppm. Iron had the largest seasonal variation, particularly on the ninth floor in the winter. Potassium, Mg, and Ca had similar seasonal variations; Na had a sharper variation. The overall average annual concentration was 16 ppm for Na, 7.492 ppm for K, 7.384 ppm for Ca, 8.060 ppm for Mg, 423 ppm for Cu, 17.3 ppm for Cd, 1.176 ppm for Mn, and 143 ppm for Ni. Positive correlation was found between concentrations of K and Na; Cu and Cd and Mn; Cd and Pb and Mn; Pb and Mn; Fe and Mn; and Fe and Mn and Ni. Negative correlations were found between Ni and Cu and Mn, and Fe and Mg. Significant correlations between metallic and non-metallic components were found for nitrate and each of Na, Cu, Mg, Ca, Cd, Pb, Mn, and Fe. A correlation between nitrate and Pb is always possible when vehicular exhaust gas is emitted. A negative correlation occurred between chloride and Cu and Mn. Sulfate and Mn had a significant correlation, possibly from the use of MnSO₄ for waste gas desulfurization. No positive correlation was found for heavy metals and dust deposits in an air filter on the ninth floor, except for Fe. The Fe concentration was 48.466 ppm in floating dusts and 45.800 ppm in filter deposits.

27100

APTIC NO. 48477

Mizoguchi, Isao, Masanobu Ohsawa, Yasuhito Sato, Kuniyoshi Makino, Midori Chigusa, and Hiroshi Yagyu

DISTRIBUTION OF HEAVY METALS IN DUSTFALL OF TOKYO METROPOLITAN AREA. (Tokyo ni okeru koka baijin-chu no jukinzoku no bunpu ni tsuite). Text in Japanese. Tokyo-Toritsu Eisei Kenkyusho Nenpo (Annu. Rept. Tokyo-to Lab. Med. Sci.), no. 23:299-308, 1972. 6 refs.

The concentration of heavy metals, including iron, manganese, copper, zinc, cadmium, and lead, in dust fall samples were

27101

measured in the Tokyo metropolitan area. The concentration of all the metals, except for Cd, tended to increase in the downtown areas. The concentrations of Cu, Mn, and Zn were at great variance, while Fe and Pb concentrations fluctuated less at each site. The concentrations of Cu, Pb, and Zn were 13-60 times greater than the Clarke's number. Some portions of the heavy metals in the air existed as the salts of sulfates, nitrates, and halogens. The correlation coefficient between sulfur dioxide and Pb, Zn in the dust fall, and Pb in the dust fall samples and in the suspended particulate samples was tested in areas of heavy traffic and industry. Dust fall in Tokyo was estimated at 7400 tons/mo with 136 tons Fe, 17.4 tons Zn, 4.67 tons Mn, 6.38 tons Pb, and 4.57 tons Cu.

27101

APTIC NO. 48670

Reynolds, F.

THE GRAVELLY HILL PROJECT. *Clean Air*, 2(7):19-21, Autumn 1972.

The Gravelly Hill Project in Birmingham initiated when a proposed expressway extension was cited as a potentially hazardous area with respect to projected vehicle emissions. To determine the danger involved in the projected road scheme, atmospheric lead concentrations were measured for a before-and-after correlation with blood lead levels of residents in the area; sulfur dioxide concentrations were monitored; and traffic flow was examined. The organization of the monitoring projects, various government involvement, and project implications are reviewed.

27102

APTIC NO. 48664

Taguchi, Keisuke

SIZE DISTRIBUTION OF SUSPENDED PARTICULATES BY ANDERSEN SAMPLER (II). (*Andasen sanpura ni yoru taiki-chu fuyu funjin no ryudo bunpu (II)*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 105. (Nov. 7-9, Paper 60.)

The particle size distribution was examined by an Andersen sampler in Osaka. The weight percentage fluctuations of MMD (mass median diameter), dusts smaller than 10 micron, and particulates smaller than 3.3 micron are presented in a graph. The fluctuation of MMD in 1972 was different from the pattern of 1971. After Feb. 1972, the average size of the particulates was more than 3 micron. Therefore, the weight percentage fluctuation of respirable dusts and the dusts less than 10 micron in diameter reversed with the fluctuation of MMD. The amount of respirable dusts was close to 60% in 1971, but dropped to 50% in 1972. The average weight percentage of particulates less than 10 micron was 75. The measurements by the Andersen sampler were compared with those of the low-vol, high-vol, and digital dust samplers. The last agreed with the measurements by the Andersen Sampler.

27103

APTIC NO. 48538

Tomita, Kinuko, Toshio Kawayara, and Takahiro Haruki

CARBON MONOXIDE POLLUTION IN UNDERGROUND PARKING LOTS. (*Chika chushajo nai CO no dotai ni tsuite*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 318. (Nov. 7-9, Paper 265.)

Carbon monoxide content in an underground parking lot was examined by changing the ventilation conditions. The operation of the exhaust system only, operation of the air supply system only, no ventilation whatsoever, operation of both exhaust and air supply at a sharp angle, and the operation of both ventilation and air supply were examined. Measurements of the temperature, humidity, air flow, wind direction, CO, and number of cars in the lot were examined under the above conditions. The air in the parking lot was very much affected by the weather conditions outside. Under any ventilation conditions, the CO distribution in the lot was not even. When

AIR POLLUTION ABSTRACTS, MAY 1973

there were about 20 automobiles, the CO concentration was 25 ppm if all the ventilation and air supply systems were stopped, 15 ppm if only the air was supplied, 10 ppm if only the exhaust system was operating, and 3 ppm if the entire ventilation system (both exhaust and air supply) was in operation.

27104

APTIC NO. 48739

Yoshizawa, Susumu, K. Irie, K. Konno, K. Kimura, K. Maegawa, and T. Yoshiwara

A STUDY ON THE OUTDOOR AIR POLLUTION LOAD FOR DESIGNING INDOOR AIR PURIFICATION EQUIPMENT. (*Shitsunai kuki joka sekkei no tameno gaiki osen fuka ni kansuru kenkyu*). Text in Japanese. *Kuki Chowa, Eisei Kogaku (J. Japan Soc. Heating, Air-Conditioning Sanitary Engrs.)*, 46(12):97-108, Dec. 1972. 15 refs.

Experiments were conducted to obtain data on air pollution loads to be used for air conditioning equipment design. Simultaneous measurements were made at five spots in Tokyo and one in Yokohama using a filter paper dust gauge. Three days occurred during intermediate seasons, 7 days of measurement were in the winter. The weight concentration was also determined. The optical concentration varied greatly; in some places great peaks were reached in a short period of time. Since these figures varied greatly, it was difficult to assume one universal figure for all parts of Tokyo. The weight concentration did not vary as much as the optical concentration, perhaps due to the fact that the period of dust collection was long, but there was the areal difference as well, although it was not as apparent as in the case of optical concentrations. The accumulated concentration distribution showed an areal difference. The volume of pollution to be eliminated in cu m/hr was correlated to the required design conditions for the pollution load for each area. The degree of pollution of each area can be expressed as the pollution load. A comparison was made between the weight method, using total particles and eliminating particles over 10 micron. The particle distribution for each area was measured with a cascade impactor.

ATMOSPHERIC INTERACTION

1973

27105

APTIC NO. 49047

Shimogata, Shigeo and Kiyoshi Sugawara

THE ESTIMATION OF SMOKE CONCENTRATION ON THE GROUND BY THE WIND TUNNEL METHOD: THE RELATION BETWEEN GROUND LEVEL CONCENTRATION AND SMOKE EXIT VELOCITY. (*Fudo jikken ni yoru chakuhi haen nodo no yosoku-chakuchi saidi nodo to toshutsu sokudo no kankei*). Text in Japanese. *Kogai (Hakua Shobo) (Pollution Control)*, 8(1):2-6, Jan. 1973. 6 refs.

A wind tunnel experiment was carried out using ethylene as a tracer gas. The wind velocity in the upper boundary layer was fixed at 6 m/sec, and the intensity of turbulence was controlled at 1.5-2.0% at 10 cm height by using turbulence control grates. Five stacks 1 mm in diameter and 10 mm, 30 mm, 40 mm, 50 mm, and 70 mm in height were used for the study. The maximum ground level concentration was inversely proportional to the square of stack height and directly proportional to smoke exit velocity times a universal function of stack height. The distance of maximum ground level concentration increased with stack height (1.16).

1972

27106

APTIC NO. 48834

Japan Environmental Agency

INVESTIGATION ON THE MOVEMENT OF POLLUTANTS BY LOCAL ATMOSPHERIC MOVEMENTS.

(Kyokuchi kiryu ni yoru osen busshitsu no iryu ni kansuru chosa). Text in Japanese. 36p., Dec. 1972.

An investigation on air pollution was carried out in the Nerima Ward of Tokyo from Aug. 16-Aug. 18, 1972. The weather during this period was clear with low wind velocity except on the night of Aug. 18 where the wind velocity increased to 7-8 m/sec. The heights of the inversion layers at 9 am were 900 m, 600 m and 700 m, respectively. The concentrations of air pollutants were measured at two areas, street areas and residential areas which were more than 100 m away from the main streets. The average concentrations of carbon monoxide, nitric oxide, nitrogen dioxide, methane, hydrocarbons other than CH₄, and sulfur dioxide at the two areas were 4.0 ppm, 0.08 ppm, 0.05 ppm, 1.5 ppm, 2.6 ppm, and 0.03 ppm, and 2.0 ppm, 0.02 ppm, 0.03 ppm, 1.5 ppm, 1.3 ppm, and 0.02 ppm, respectively. Air pollutants were decreased to 1/2 at the main street areas during the traffic restriction. A tracer experiment using sulfur hexafluoride revealed that the diffusion in this area was about normal.

27107

APTIC NO. 48978

Bacso, Nandor

METEOROLOGICAL FACTORS OF HUMAN ENVIRONMENT. (Az ember környezetnek meteorologiai tényezői).

Text in Hungarian. Idojaras (Budapest), 74(3):197-207, 1972.

The relations of man with his environment are discussed with special regard to meteorological factors and air pollution. While man is not able to control the inorganic environment, and particularly climate and atmospheric phenomena except on a limited local scale, the ever increasing urbanization with its hazards (congestion, air pollution (due to domestic, industrial, and automotive exhaust emissions), and reduced amount of solar radiation reaching the surface) has radically changed living conditions. The particular hazards of anthropogenic pollutants, relatively unimpressive with 20 million t/yr, reside in their concentration over limited, densely populated areas. Atmospheric mass exchange in urban areas is unable to come to full effect, and anticyclones in particular may well lead to the buildup of hazardous pollutant concentrations. The World Meteorological Organization has lately decided to set up a world wide monitoring network for permanently surveying air pollution conditions and changes in various parts of the world, for the determination of their possible causes. In addition, meteorologists and climatologists support regional and urban planning specialists and hygienists in their solving pollution related environmental problems.

27108

APTIC NO. 48899

Badayev, V. V.

APPLICATION OF THE STATISTICAL REGULARIZATION METHOD TO DETERMINATION OF AEROSOL MICROSTRUCTURE FROM AUREOLE MEASUREMENTS. Bull. Acad. Sci. USSR, Phys. Atmos. Oceans (English translation from Russian of: Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana), 8(3):160-164, March 1972. 18 refs.

The method of statistical regularization of solutions of inverse problems was used to find the aerosol particle size distribution function $f(a)$ from measurements of the angular dependency of the scattering function in the ground layer of the atmosphere. In this method, the autocorrelation function of aerosol microstructure is specified as a characteristic of the a priori distribution of the profiles $f(a)$, which are taken to be random functions. The method was tested in the determination of a water-

droplet spectrum from scattering functions measured in fogs containing particles up to 50 micron in diameter. Test results were encouraging.

27109

APTIC NO. 48677

Baudouin, P.

THE TIME FACTOR IN ATMOSPHERIC POLLUTION MEASUREMENTS. (Le facteur durée dans les mesures de pollution atmosphérique). Text in French. Entropie, no. 45, p. 31-36, May/June 1972. 3 refs.

Variations in the concentration of a gas pollutant in the atmosphere are described statistically by a lognormal program in which the mean value of the concentrations was a power function of the duration of measurement. Pollutant distribution and measurement duration data can be used with the model to forecast approximately the pollution probabilities for any exposure length. The most critical aspects of pollution in an area, expressed in terms of duration and frequency, can be estimated quickly, and air quality standards given for measurement durations can be compared with the actual sampling times.

27110

APTIC NO. 48769

Bhattacharyya, B.

SOME ASPECTS OF AIR POLLUTION. J. Inst. Engrs (India) (Calcutta), 52(10):79-83, June 1972. 7 refs.

Some aspects of air pollution and the control of primary emissions generated directly by identifiable sources and mainly the products of fossil fuel combustion are reviewed. The effects and nature of air pollutants, dust deposition, dispersion factors, maximum ground level concentrations, general rules for stack height, long distance pollution, and low level emissions are defined. The pollutants studied include smoke, dust, carbon dioxide, carbon monoxide, and sulfur dioxide. The fundamental requirements for smokeless combustion are sufficient temperature and time, adequate turbulence for good mixing, and sufficient oxygen. Suitable combustion equipment and proper maintenance are also imperative.

27111

APTIC NO. 48597

Eda, Shizuo, Hiroshi Ito, Hiroshi Hikichi, and Hiroshi Murata

RELATION BETWEEN SULFUR OXIDE CONCENTRATION IN ATMOSPHERE AND HEAVY METAL POLLUTION IN SOIL. (Taikichu io sankabutsu no dojochu jukinzoku osen tono sokansei). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 8(11):1067-1073, Nov. 1972. 10 refs.

Concentrations of sulfur oxides were measured 5 m above the ground at 17 measuring spots in an industrial area of Iwaki city. The major industry in the area is smelting. Within 1 m of the smelters, SO_x concentration was 3 mg/100 cu cm. Depending on wind direction, the concentration was lowest 2-3 km from the mill and highest 4-5 km away. The heavy metal pollution of the soil correlated extremely well with SO_x pollution. High heavy metal pollution was observed near the mills; then the pollution gradually decreased with distance from the smelter mills. There was a 1 km lag between the SO_x concentration and soil pollution curve due to the falling of heavy metal particles. Three kilometers from the mill, the particle deposition speed was 0.3 m/sec and the particle diameter was 20-50 micron, corresponding to the diameter of particulates which accumulated in the rainpipes of houses in the area. These figures were interpreted to equal the average size of particles coagulated by the electric dust collector or particles coagulated with sea spray.

27112

APTIC NO. 48780

Fujii, Toru, Nobuko Tajima, Yoshinari Kurosaka, Kenichiro Yoshimura, Kaori Inoue, Keisuke Taguchi, Yoshinori Nishikawa, Hiroshi Hatanaka, and Kenji Oka

STUDIES ON THE AIR POLLUTION BY PHOTOCHEMICAL REACTION. (Kokagaku hanna ni yoru taiki osen ni kansuru kenkyu (1)). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 80. (Nov. 7-9, Paper 28.)

Various factors for photochemical pollution were investigated in three areas of Osaka Prefecture. Oxidants were measured by potassium iodide colorimetry, ozone by ethylene chemiluminescence, total hydrocarbons by hydrogen flame and nitric oxide and nitrogen dioxide by the Saltzman method; sulfur dioxide, ultraviolet rays, visible rays, temperature, humidity, wind direction, and wind velocity were also continuously measured. Sulfuric acid mist, dusts, aldehydes, and low molecular hydrocarbon compositions were examined. When the oxidant concentration rose, the ozone levels in all three areas also rose. The ozone level rose most frequently in August, during the day. Ozone rose notably in the south of the Prefecture, then in the north, but only moderately in the city of Osaka. There was a clear relationship between the rise of ozone and the fluctuation of concentrations of NO, NO₂ and total hydrocarbons. NO decreased with the rise of ozone, but the other two generally rose. The SO₂, sulfuric acid mist, and aldehyde concentrations also showed limited rises. The rise of ozone frequently occurred when the wind came from the sea, and the peak seemed to appear 1 or 2 hours after the peak of the ultraviolet rays.

27113

APTIC NO. 48655

Fukuoka, Saburo, Mitsuru Utagawa, Masanao Funashima, Masashi Ito, and Toshio Odaira

VERTICAL DISTRIBUTION OF OXIDANTS CONCENTRATION IN TOKYO. (Okishidanto nodo no kodobetsu bunpu). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 61. (Nov. 7-9, Paper 9.)

The oxidant concentration distribution was measured in the upper atmosphere of Tokyo, using the Tokyo Tower, a balloon, and a helicopter during the summer of 1971. Samplings were taken for 15 min at a time and analyzed by the neutral potassium iodide automatic recorder. The frequency of oxidant appearances at the three altitudes of the Tokyo Tower (25, 125, and 225 m) varied considerably. When atmospheric instability existed up to 221 m, Ox appeared at all three altitudes. When there was a stable layer at the low altitude between 64 and 169 m, pollution was complex, and irregular patterns of high concentration appeared at 25 m and 225 m. The pattern of high concentration oxidant was entirely different from that of sulfur dioxide, and it did not decrease further inland. It is conjectured that the pollutant was supplied from the ground in the lee.

27114

APTIC NO. 48892

Fukuoka, Saburo

PRESENT STATE OF PHOTOCHEMICAL SMOG IN TOKYO. (Tokyo ni okeru kokagaku ni yoru taiki osen no genjo). Text in Japanese. Jidosha Gijutsu (Automobile Eng.), 26(9):1036-1042, Sept. 1972, 4 refs.

High concentrations of oxidant appear more frequently in inland areas than in coastal areas, and in residential areas such as Setagaya and Hachioji, where the concentration of primary pollution was low and where there are frequent incidences of high concentrations of oxidant. Higher frequencies of oxidant concentrations occur when it is both cloudy and clear, and not necessarily on a clear day, perhaps due to the fact that on fine days, the sea breeze is stronger, and there is atmospheric instability. High concentrations of oxidant exist in the atmosphere as high as 170 m above the ground, but what effect

they have on the ground is not known. Nitric oxide and nitrogen dioxide are related with preliminary photochemical reactions. In smog chambers, there is an NO concentration peak observed at first, followed by a peak of NO₂ concentration, and finally, oxidant concentration peaks. There is not much data on continuous measurement of hydrocarbons. However, HC concentrations seem to rise before oxidant concentrations rise. Since an ozone measurement device by the ethylene method has been developed, it is now possible to compare the results of oxidant measurements. In the case of Tokyo, most of oxidant is ozone. The aerosol concentration does not necessarily reach its peak at the same time as that of oxidant. Generally, before the oxidant concentration rises, the aerosol concentration is high. A study of photochemical smog in Tokyo has just started; and there are many problems unsolved, such as the quantitative method of measuring peroxyacetyl nitrate, the study of HC, related with photochemical smog, flow, diffusion of photochemical smog, and basic experiments by smog chambers.

27115

APTIC NO. 48645

Fukuoka, Yoshitaka

AIR POLLUTION AND MICROMETEOROLOGY INSIDE AND OUTSIDE THE TUNNEL. (Tonneru naigai no taiki osen to bikisho). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 295. (Nov. 7-9, Paper 249.)

The 700-meter long tunnel constructed in April 1970 through a small hill in the middle of Fukushima city caused an increase of traffic on Route No. 13. The average number of cars on the road was 15,000/day, and the trees near the tunnel and at the foothill were damaged severely. Measurements of carbon monoxide, nitrogen dioxide, and partial measurements of sulfur dioxide and formaldehyde were taken at the exits and inside the tunnel on various days in 1971 and 1972, and the relationship with the temperature, humidity, wind velocity, and the amount of traffic were examined. The number of cars and the plant damage conditions were compared with those in the control area. No close relationship was found between the degree of traffic and the pollution concentration, although the amount of CO seemed to rise slightly when the traffic was heavy. The NO₂ concentration seemed to be affected by the sunlight more. The tunnel ran from north to south. The wind was more frequently from a northerly direction, and the velocity was much lower than the wind velocity outside. This caused pollutants to stagnate inside the tunnel, and the concentration was often heavier at the southern exit than at the northern exit.

27116

APTIC NO. 48653

Funabashi, Nobutoshi, Makoto Shioya, Fumiaki Miyamoto, Yoshinori Ishikawa, Yasuo Yagi, Fujihiko Kure

URBAN AIR POLLUTION SIMULATION BY A MULTI-BOX MODE. (Taju bokkusu moderu ni yoru toshi taiki osen no shimyureshon). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 286. (Nov. 7-9, Paper 240.)

Based on the idea of a simulation model, a multi-box model involving a large quantity of very general data accessible at any time was designed. The necessary data for simulation include the wind direction, wind velocity, temperature, and the emission quantity from the pollution sources of a given locality. The model comprises the meteorological distribution calculation, the emission calculation, and the pollutant movement calculation in simulation boxes. The emission quantity is converted into a cubic emission calculation obtained by pollutant spatial distribution, the total quantity of emission gases, and the time fluctuation of gas temperature in a box. The total area is divided into 28 districts, and a layer 400 m deep is divided into two layers of 200 m; the total of 56 boxes express the atmospheric condition of the area. The movement of pollutants between boxes are calculated by the air mass sampled from

ATMOSPHERIC INTERACTION

27123

the rules of material collection and distribution. The time required for the handling of the data for the computer for a 24-hour simulation is approximately 30 min. The results of a simulation of the Osaka area and the mathematical analyses are presented.

27117

APTIC NO. 48698

Furuse, Bin and Motoyasu Kamata

MODEL TESTS ON GAS DIFFUSION NEAR BUILDINGS. (*Tatemono kinbo ni okeru osenbutsu kakusan ni kansuru kiso kenkyu*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 283. 4 refs. (Nov. 7-9, Paper 237.)

The characteristics of pollutant dispersion patterns near building walls were examined by a wind-tunnel model. A measuring tunnel of 6.4 by 2.7 by 2.7 m was added to the Eiffel wind tunnel, and the building model was a cube of 38.2 cm width, length, and height. Propane was used as a tracer gas and hydrogen flame gas chromatography was used for measurement. The results are presented in a table. When the turbulence was 16 cm, the maximum concentration appeared in the lee, and when 8 cm, it appeared in the direction of the wind. When the turbulence was 16 cm, almost no trace of pollutant was detected on the side of the building. These results may be explained by the previously published theory that the turbulence that left the corner of a building reattaches at a point near the angle. For measuring the concentration near the wall, measurements should be taken without turbulence or little turbulence.

27118

APTIC NO. 48772

Georgii, H. -W. and G. Gravenhorst

STUDIES OF THE CONSTITUTION OF THE AEROSOLS OVER THE ATLANTIC OCEAN. (*Untersuchungen zur Konstitution des Aerosols ueber dem Atlantischen Ozean*). Text in German. Meteorol. Rdsch., 25(6): 180-181, 1972. 7 refs.

Studies of the maritime aerosols over the Atlantic in 1969 and 1971 revealed an unexpectedly high number of sulfate particles between 0.2 and 1 micron in diameter over the ocean. In this size range the sulfate particles prevailed over all other maritime aerosols. The concentration of the background aerosol on the lower air levels over the ocean amounted to between 300 and 600 particles/cu m, which is about the same as the concentration in the central troposphere above continents. Sea salt particles constituted only a minor fraction of the maritime aerosol in the bottom air layers over the ocean (up to 2 km).

27119

APTIC NO. 48473

Gifford, F. A., Jr.

ATMOSPHERIC TRANSPORT AND DISPERSION OVER CITIES. Nucl. Safety, 13(5):391-402, Oct. 1972. 78 refs.

In cities, atmospheric dispersion and transport of pollutants are affected by parameters unique to the urban environment, principally the enhanced surface roughness and heat capacity. The effects of these urban parameters on the micrometeorology of the atmospheric boundary layer are reviewed within the context of urban source diffusion models. The major urban sources include isolated tall stacks (electric power generation); smaller, lower industrial stacks; area sources (domestic heating); and mobile sources (vehicles and aircraft). The frequency distribution of air pollution concentrations and chemical reactions and removal processes in the atmosphere, e.g., radioactive decay, scavenging, fallout and contact removal, and reactions of nitrogen oxides, sulfur oxides, and hydrocarbons, are reviewed. The boundary layer over a city is usually nearly adiabatic. Dispersion is enhanced by the increased urban roughness, although transport by the mean wind is slightly decreased by the aerodynamic drag. (Author abstract modified)

27120

APTIC NO. 48500

Goto, Masahiro, Shunsaku Jikihara, and Takeo Mizui

METEOROLOGICAL ELEMENTS IN THE APPEARANCES OF OXIDANTS IN AMAGASAKI CITY. (*Amagasaki shi no okeru Ox konodo to kisho*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 302. (Nov. 7-9, Paper 30.)

In Amagasaki City, air pollution by oxidants are continuously monitored by a telemeter system. High concentrations of more than 0.1 ppm occurred frequently this year and the trends were examined and reported. In general, concentrations were higher this year (1972) than last year; high concentration seemed to appear behind a high pressure system, when the pressure gradient was slow and the wind was weak, when the sunshine was strong, immediately after a NE wind changed to SW, and when there was a stagnant atmosphere. The time lag of high concentrations in the central part and northern part of Amagasaki is about 30 min, the central city reaching the peak first.

27121

APTIC NO. 48848

Graefe, Kurt

ON SOME SO₂ MEASUREMENTS IN HAMBURG FROM 1958 TO 1972. (*SO₂-Registrierungen in Hamburg von 1958-1972*). Text in German. Staedtehygiene (Uelzen/Hamburg), 23(12):286-290, 1972. 11 refs.

A comparison between sulfur dioxide averages and SO₂ wind roses showed a decrease with time in domestic and industrial areas. One of the main reasons for this is the use of high chimneys. Atmospheric diffusion formula were used to determine diffusion, considering the SO₂ concentration and buildings. At a height of 62, 90, and 154 m, SO₂ concentrations were higher than at lower levels. Sixteen of 30 wind roses were drawn on a map of Hamburg to show the main emission sources. The use of such continuous records for air hygiene problems and for reducing air pollution are mentioned. With the continuous recordings of SO₂ concentrations for 14 years and the SO₂ wind roses, main sources can be pinpointed and the best location for new sources can be determined. For the erection of new residential areas and high-rise buildings, these data are valuable for determining the maximum height of the buildings. The data permitted the location and determination of the operating times of even a small source emitting 0.3 kg/hr of SO₂.

27122

APTIC NO. 48694

Haenel, Gottfried

COMPUTATION OF THE EXTINCTION OF VISIBLE RADIATION BY ATMOSPHERIC AEROSOL PARTICLES AS A FUNCTION OF THE RELATIVE HUMIDITY, BASED UPON MEASURED PROPERTIES. Aerosol Sci., 3(5):377-386, Sept. 1972. 17 refs.

Extinction coefficients of atmospheric aerosol particles versus relative humidity and wavelength of light at 0.3-1 micron were calculated, based on measurements of physical properties. Models were constructed for computations for sea spray aerosol, aerosol with desert dust, and urban aerosol. In the humidity range (0.4 (0.75) is less than or equal to f is less than or equal to 0.999) there exists a simple relationship between the extinction coefficient of atmospheric aerosol particles at the wavelength of light 0.55 micron and the relative humidity. The basic theory, model assumptions, experimental background, and test results are defined. Mean refractive indices at 25 °C are listed for water and model aerosols. (Author abstract modified)

27123

APTIC NO. 48920

Harris, Franklin S., Jr.

CALCULATED MIE SCATTERING PROPERTIES IN THE VISIBLE AND INFRARED OF MEASURED LOS ANGELES AEROSOL SIZE DISTRIBUTIONS. Appl. Opt., 11(11):2697-2705, Nov. 1972. 119 refs.

Aerosol size distributions of varying types selected from those measured in clear air, smog, and fog in the Los Angeles Basin were used with Lorenz-Mie scattering theory to predict radiation scattering by aerosols. Eleven different indices of refraction were assumed for wavelengths within 0.488-8.4 micron for aerosol materials with varying humidity and for water and quartz. The effects on the scattering by the type of size distribution and the complex index of refraction was shown as a function of the polarization parameters, polarization ratio, ellipticity, and the inclination angle of the polarization ellipse. (Author abstract modified)

27124

APTIC NO. 48966

Harrison, Halstead, Jack Herbert, and Alan P. Waggoner

MIE-THEORY COMPUTATIONS OF LIDAR AND NEPHELOMETRIC SCATTERING PARAMETERS FOR POWER LAW AEROSOLS. *Appl. Opt.*, 11(12):2880-2885, Dec. 1972. 12 refs.

The ratios of lidar backscatter to nephelometric total scattering cross sections were computed for power law aerosols. Effects were explored of variations of size distributions, indices of refraction, and radial inhomogeneity of the scattered particles. Reasonable values for these parameters can be chosen so that observed and computed backscatter ratios agree. The general angle-resolved differential scattering problem is discussed briefly with emphasis upon derivable information from scattering measurements in the atmosphere. (Author abstract)

27125

APTIC NO. 48841

Hoshika, Yasuyuki

SEVERAL REACTIONS OF OFFENSIVE ODOR SUBSTANCES IN THE ATMOSPHERE. PART I. ATMOSPHERIC CHEMISTRY FOR SULPHUR COMPOUND. (*Akushu busshitsu chu no taikichu ni okeru shohanno*). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 8(12):1157-1159, Dec. 1972. 14 refs.

Data concerning behavior of odorous substances in the atmosphere will be necessary in the future, since there has not been much work made on these points. The reaction of hydrogen sulfide with ozone and the reaction of H₂S with atomic oxygen have been studied. Oxidation of H₂S by oxygen in the atmosphere does not occur, but the oxidation of H₂S in water does occur. Photodissociation of H₂S has been studied, but no chain reaction in air has been studied. Thermal breakdown of H₂S does not occur without catalysis at a temperature less than 350 C. The Wackenroder reaction of H₂S with sulfur dioxide has also been studied. Oxidation of methyl mercaptan without catalysis in the atmosphere occurs only at temperatures over 200 C, while oxidation in water occurs at room temperature, oxidized substances being dependent upon pH of water. Photodissociation of methyl mercaptan produces hydrogen, dimethyl disulfide, methane, H₂S, and dimethyl sulfide. In the presence of ammonia or hydroxylamine, methyl mercaptan is said to be easily oxidized to become disulfide. Oxidation of methyl mercaptan progresses by stages. Photodissociation of dimethyl sulfide and dimethyl disulfide other than in air have also been studied; gas change of dimethyl sulfide in air, 0.006-84 ppm, tested for 6 days.

27126

APTIC NO. 48874

Hoshino, Tsuneo

METEOROLOGICAL EFFECTS ON THE MONTHLY MEAN DISTRIBUTION OF SO₂. (*Tsuki heikin SO₂ nodo bunpu to kisho*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 300. (Nov. 7-9, Paper 254.)

The monthly averages of the sulfur dioxide concentration distribution for 1968 in the Ube-Onoda area are almost the same throughout the year. The characteristics are as follows: the peaks of heavy concentrations are divided clearly into the Ube area and the Onoda area; the transition of SO₂ is clearly marked toward all the rivers and valleys; the peaks of concen-

AIR POLLUTION ABSTRACTS, MAY 1973

tration in each area are approximately 4 km from the main stacks. To see whether these characteristics can be explained by the meteorological characteristics of the area through the year, the wind direction, wind velocity, and atmospheric stability were examined. The wind direction showed that the air movement was from Onoda to Ube in the winter (from northwest to southeast), and in warm months from Ube to Onoda (SE to NW). The average wind velocity was almost the same every month, ranging 3.2 to 4 m/sec. The atmospheric stability mode was mostly the D type according to the Pasquill weather map.

27127

APTIC NO. 48971

Hoshino, Tsuneo

COMPOSITE EFFECT OF LARGE STACKS ON THE MONTHLY MEAN SURFACE SO₂ CONCENTRATION. (*Tsuki heikin SO₂ nodo bunpu to kisho*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 277. (Nov. 7-9, Paper 231.)

The air pollution concentration distribution over Ube and Onoda was explained by the meteorological characteristics of the area. The data used were the sulfur dioxide concentration measurements taken at 35 locations by the lead dioxide method in Sept. 1968, the upper strata wind in the area for the same period, and calculation of dispersion by the areas 16 major stacks, which represent some 70% of the emission. Dispersion was calculated using Pasquill's formula; the Holland formula was used for effective stack heights; and the effects of localized wind were examined. The concentration calculated from the equation and the actual SO₂ concentration measurements agreed quite well, though actual measurements were greater, because only 16 stacks were represented in the calculation. The results are presented in a weather map and a concentration distribution map.

27128

APTIC NO. 48754

Idso, S. B., R. S. Ingram, and J. M. Pritchard

AN AMERICAN HABOOB. *Bull. Am. Meteorol. Soc.*, 53(10):930-935, Oct. 1972. 3 refs.

Dust and sand storms, known as haboobs, in Arizona are discussed. Most of the storms are caused by downdrafts from thunderstorms. The air mass thunderstorm activity seems to be generated in the convergence of moist, semi-tropical air raised by up-canyon winds on east-facing slopes in the late morning and the up-canyon winds on highly heated west-facing slopes during the afternoon. Most dust storms are followed by thunder and/or rain after a time interval varying up to 2 hours. Squall line characteristics shown by satellite photographs and on radar are discussed. General characteristics of dust storms, including wind speed, temperature, relative humidity, and arrival time, recorded at different weather stations are listed. The Arizona haboob of July 16, 1971 is described in detail.

27129

APTIC NO. 48537

Kaji, Makoto, Hisao Ota, Michio Ito, Tetsufumi Saito, Daijiro Kita, Masao Shishigura, Kikuo Izumi, and Yoshiko Taniguchi

A CLIMATOLOGICAL INVESTIGATION OF PHOTOCHEMICAL SMOG FORMATION. (*Kokagaku sumoggu hassei kiko no kishogakuteki chosa*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 303. (Nov. 7-9, Paper 31.)

A close relationship between the lower atmosphere and high concentrations of oxidant was suspected and examinations of meteorological parameters in the lower atmosphere were conducted. For the lack of maximum mixing depth (MMD) data for the Tokyo Bay area, those of the Chiba Prefecture was used. Data collected by pilot balloons in the skies of Ichihara city were used for forming an isopleth of wind direction and

velocity. Using the data on ground winds, a ground weather map was formed. Up to 1000 m, when the wind was less than 3 m/sec and when a wind shear existed in the area of 1500 m altitude, a relatively high concentration of oxidant was reached throughout Chiba Prefecture; but when the shear existed near 2200 m, localized pollution tended to appear. When there was an even and strong wind of more than 5 m/sec in the upper sky, if the wind direction was S SW, high concentrations occurred sometimes. Even if the first conditions mentioned above were met, if there was in one localized area of less than 500 m altitude a strong wind, like a jet current, the high concentrations did not occur.

27136

APTIC NO. 48683

Kamra, A. K.

MEASUREMENTS OF THE ELECTRICAL PROPERTIES OF DUST STORMS. *J. Geophys. Res.*, 77(30):5856-5869, Oct. 19, 1972. 20 refs.

Characteristics of the electrification in dust storms were studied by making field observations at different places in the south-western United States. Measurements were made of the atmospheric electric potential gradient at ground level, space charge and wind speed at 1.25 m above the ground, atmospheric temperature, relative humidity, and size distribution of dust particles at ground level. During dust storms, both signs of potential gradient can occur at ground level, and any sign of potential gradient can be associated with the same or opposite sign of space charge at 1.25 m above the ground. In some dust storms the polarities of potential gradient and space charge were observed to change if the blowing dust was raised because of low wind speeds only to lower levels, rather than to high altitudes. Size distributions of different types of dust particles collected at ground level are given. (Author abstract modified)

27131

APTIC NO. 48889

Kato, Tatsuo, Yoshiyuki Horimoto, and Hiroshige Kaji

RESEARCH OF PHOTOCHEMICAL SMOG MATERIAL. NO. 2: ENVIRONMENTAL ANALYSIS BY GC, 1971-72. (*Kokagaku sumoggu genin no chosa kenkyu, sono 2, GC-ho ni yoru kankyo bunseki no tsunen kekka*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan. Soc. Air Pollut., 13th, 1972, p. 73. (Nov. 7-9, Paper 21.)

A total of 1500 air samplings were taken in 1971-72 (12 months) in two areas of Kanagawa Prefecture, Tokyo, Osaka, and Yokkaichi for some basic data about photochemical smogs. One hundred liters of each sample were analyzed by gas chromatography, and 30 elements were detected. The components can be divided into two groups: hydrocarbons that are incompletely burned, and the elements that have been decomposed or changed, such as aldehydes, nitrogen compounds, halogens, and oxone. The changes in hydrocarbons were studied. There are three groups of hydrocarbons: hydrocarbons, aromatic hydrocarbons such as benzene, toluene, ethylbenzene, xylene, and low hydrocarbons such as butane and propene. In normal atmosphere, these three parts are approximately the same in amount; however, in the samplings taken, the ratio of aromatic hydrocarbon was approximately 44% of the total. The concentration of toluene was especially high. The ratios of these hydrocarbons in the samplings were approximately the same as the ratios in automobile exhaust gases. The measurements and the fluctuation rate of acrolein were the highest among aldehydes; the rate was 78.3% in the summer and 100% in winter. The average acrolein quantity was 7.2 ppb, but sometimes exceeded 100 ppb. In automotive exhaust gas 10 ppm is contained. The frequency of ozone detection in the sampling by gas chromatography was about 40%. The maximum measurement was 320 ppb, and the normal amount was less than 30 ppb. There was no seasonal fluctuation for ozone.

27132

APTIC NO. 48890

Kato, Tatsuo, Yoshiyuki Horimoto, and Hiroshige Kaji

RESEARCH OF PHOTOCHEMICAL SMOG MATERIALS. NO. 3: THE RELATIONSHIP BETWEEN SMOG MATERIAL AND AUTO EXHAUST. (*Kokagaku sumoggu genin no chosa kenkyu, sono 3: Sumoggu-ji taiki no haiki gasu seibun no sokan*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc., Air Pollut., 13th, 1972, p. 74. (Nov. 7-9, Paper 22.)

The components of photochemical smog and the changes in the composition of exhaust gases were examined. Five samplings were taken on the campus of the Yokohama National Univ. on June 10, 1972. At 12:30, 354 ppb of acrolein and 64 ppb of ozone were detected in the sample. At 1:30 pm, 419 ppb of acrolein was measured, and at the same time, some health damage incidents occurred at a nearby high school campus. The acrolein concentration decreased in the evening and a normal condition returned about 8 pm. In a Tokyo suburban junior high school, a series of smog incidents occurred between May 29 and June 6, 1972, in spite of low oxidant concentration in the atmosphere. During this period, 13 samplings were taken in the area, and 171 ppb of toluene and 109 ppb of acrolein were found in two samplings. The fluctuation of the composition of automotive exhaust gases was observed. Ozone and nitrogen oxides were added and the changes of elements were observed. With ozone, the ratios did not change; the quantities of toluene and xylene stayed approximately the same. With NOx, xylene decreased. When light irradiation was applied, toluene decreased and acrolein increased. When gasoline without aromatics was tested under the same conditions, no acrolein was formed.

27133

APTIC NO. 48997

Kattawar, George W. and Gilbert N. Plass

DEGREE AND DIRECTION OF POLARIZATION OF MULTIPLE SCATTERED LIGHT. 1: HOMOGENEOUS CLOUD LAYERS. *Appl. Opt.*, 11(12):2851-2866, Dec. 1972. 15 refs.

The degree and direction of polarization are calculated by a Monte Carlo method for homogeneous layers corresponding to the haze, nimbostratus, and ice crystal modes. Two solar zenith angles and a range of optical thicknesses up to 10 are considered, and the results are compared with calculations for single scattered photons. For a given pair of incident and scattered directions, there are only two possible values for the direction of the polarization for single scattering -- it must be within or perpendicular to the scattering plane. The choice between these two values depends only on the sign of the element M in the first row and second column of the scattering matrix in the I, Q, U, V representation. In most cases there is little change in the direction of polarization when multiple scattering is taken into account, so that this quantity with respect to a meridian plane can usually be predicted from a very simple trigonometric relationship to good accuracy. The partial scattering angles at which M changes sign are unique for a particular aerosol model. Thus, different size distributions and refraction indices can be distinguished by measurements of the direction of polarization. (Author abstract modified)

27134

APTIC NO. 48865

Kawamura, Takeshi and Mitsuo Kasuya

METEOROLOGICAL FORECAST OF PHOTOCHEMICAL SMOG. (*Kokagaku taiki osen no kisho yoho*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 62. (Nov. 7-9, Paper 10.)

Photochemical smog forecasting is given by the Meteorological Agency through two channels: all the autonomous governments of the Tokyo area and nearby prefectures are notified through their respective weather stations, and the general

public is notified through the mass communication media. Both announcements are made on the previous day in the evening, and the morning of the day with the any further adjustment. The deciding factors are in wind direction, velocity, maximum depth altitude, presence of the descending current in the lower layer, sea and land breezes, maximum temperature, and duration of solar radiation. The conditions that are likely to create photochemical smog in the Tokyo area are: a break in the middle of the rainy season or the end of it (June Aug.), the front of a high pressure area moving southward from the north; when the air pressure gradient is extremely weak and when a high pressure belt is weakening and a pressure trough is created in northern Japan; when the temperature is higher than 24 °C; when the wind velocity is less than 4 m/sec; when the humidity is between 60-80% in the early morning; when the visibility is less than 2-3 km in the business district in Tokyo, and when there is at least 2-3 hr of sunshine before 2 pm.

27135

APTIC NO. 48622

Lantz, R. B., R. C. McCulloch, and R. K. Agrawal

THE USE OF THREE-DIMENSIONAL NUMERICAL AIR POLLUTION MODELS IN PLANNING PLANT LOCATION. DESIGN AND OPERATION. *J. Can. Petrol. Technol.*, 11(3):18-25, July/Sept. 1972. 14 refs. (Presented at the Canadian Institute of Mining and Metallurgy, Petroleum Society Technical Meeting, Annual, 23rd, Calgary, Alberta, May 1972.)

The use of a comprehensive mathematical model that describes wind flow over or around topographical features, simulates transient wind conditions, and simultaneously solves for the pollutant concentrations caused by multiple sources is reviewed. The three-dimensional equation for velocity potential was modified to include inviscid potential flow at high elevations and height dependent coefficients which account for surface friction in the boundary layer. The applications of the model include determination of plant location, plant design and operation in areas of complicated topography, and the determination of monitor locations. The use of the model to provide complete areal and vertical coverage of pollutant concentrations is also discussed. (Author abstract modified)

27136

APTIC NO. 48682

Miller, J. M. and Rosa G. de Pena

CONTRIBUTION OF SCAVENGED SULFUR DIOXIDE TO THE SULFATE CONTENT OF RAIN WATER. *J. Geophys. Res.*, 77(30):5905-5916, Oct. 20, 1972. 24 refs.

The rate of formation of sulfate ions in raindrop-size distilled water drops was measured for partial pressures of sulfur dioxide ranging from 0.000001 to 0.004 atm. A model was developed based on the results and on the assumption that the rate of formation of sulfate was determined by the rate of the first dissociation of sulfurous acid and by the rate of oxidation of sulfite to sulfate. The results of the model agree with published data for the rate of solution of SO₂ at low partial pressures. The model was applied to rainout and washout of SO₂ by cloud and raindrops. The contribution of the sulfate formed by gaseous absorption to the sulfate content of rain water was calculated. Fog droplets, after absorbing SO₂ in relatively polluted areas, produce particles of cloud nucleus size by evaporation. (Author abstract modified.)

27137

APTIC NO. 48506

Pedder, M. A.

THE CORRELATION OF AITKEN NUCLEUS CHARACTERISTICS WITH MASS CONCENTRATION IN ATMOSPHERIC AEROSOL. *Atmos. Environ.*, 6(10):735-742, Oct. 1972. 8 refs.

The daily geometric means of total Aitken nucleus concentration (Z) and equivalent radius (R) and the daily mean smoke mass concentration (M) of atmospheric aerosols as estimated

from the soiling of a filter paper were determined for 60 one-day sampling periods. The functions Z and M were poorly correlated, but the function ZR(3) was highly correlated with and proportional to M, indicating a limited degree of similarity in the size distribution of atmospheric aerosol which extends into the Aitken nucleus subrange. Diurnal and seasonal variations were noted. (Author abstract modified)

27138

APTIC NO. 48998

Plass, Gilbert N. and George W. Kattawar

DEGREE AND DIRECTION OF POLARIZATION OF MULTIPLE SCATTERED LIGHT. 2: EARTH'S ATMOSPHERE WITH AEROSOLS. *Appl. Opt.*, 11(12):2866-2879, Dec. 1972. 7 refs.

The degree and direction of polarization are calculated by a Monte Carlo method for the reflected and transmitted photons from the atmosphere. The solar photons are followed through multiple collisions with aerosols and Rayleigh scattering centers in the atmosphere. The aerosol density and the ratio of aerosol to Rayleigh scattering vary with height. The aerosol index of refraction is assumed to be 1.55. The proportion of aerosol to Rayleigh scattering is appropriately chosen at each wavelength (lambda equals 0.4 micron and 0.7 micron); ozone absorption is included where appropriate. Three different aerosol number densities are used to study the effects of aerosol variations. Results are given for a solar zenith angle of 81.37 deg and various surface albedos. The radiance and polarization of the reflected and transmitted photons is particularly sensitive to the amount of aerosols in the atmosphere at certain angles of observation. The direction of polarization shows little dependence on surface albedo. (Author abstract modified)

27139

APTIC NO. 48900

Poet, S. E., H. E. Moore, and E. A. Martell

LEAD 210, BISMUTH 210, AND POLONIUM 210 IN THE ATMOSPHERE: ACCURATE RATIO MEASUREMENT AND APPLICATION TO AEROSOL RESIDENCE TIME DETERMINATION. *J. Geophys. Res.*, 77(33):6515-6527, Nov. 20, 1972. 20 refs.

Procedures developed for the sequential chemical separation and radiochemical analysis of lead (210), bismuth (210), polonium (210), and strontium (90) are described. Results from measurements of these radioisotopes in surface air and precipitation samples collected in Boulder, Colo., are presented. Surface and atmospheric sources of the radioisotopes are discussed along with the application of the radioisotopes as tracers for estimating the residence times of particles in the lower atmosphere. The results indicate that the simple steady-state model does not apply to Pb(210), Bi(210), and Po(210) and that published estimate times based on Po(210)/Pb(210) ratios are incorrect and too long. On the basis of Bi(210)/Pb(210) activity ratios, corrected for the presence of an assumed secular equilibrium component of Pb(210), Bi(210), and Po(210), particles of continental surface origin spend about 4 days in the lower troposphere and about 1 wk at and below precipitation cloud levels. Further tests of the steady-state assumption and other factors affecting such estimates are in progress. (Author abstract modified)

27140

APTIC NO. 48486

Rosen, J. M., D. J. Hofmann, T. J. Pepin, and J. Kroening

EXTENSIVE DUST LAYER IN THE NORTHERN HEMISPHERE. *Nature (London)*, 240(5380):347-348, Dec. 8, 1972. 2 refs.

A dust layer covering much of the northern hemisphere was observed during the summer of 1972. The altitude of the layer was 8-9 km with typical submicron particulate concentrations of 1-10/cu cm. Following the volcanic eruption of Alaid, an effort was made to assess the downwind effects at a distance of approximately 4000 mi. Measurements were made at Panama;

Palestine, Texas; Laramie, Wyoming; Duluth, Minnesota; and Ft. McMurray, Canada, using a dustsonde. The altitude and potential temperature of the dust layer was summarized for the individual soundings. The layer spreading seems to have been at a relatively constant altitude or pressure rather than along the lines of constant potential temperature. However, a systematic decrease in the altitude and concentration of the layer over Laramie was seen. Volcanic gases may have penetrated the tropopause, in which case they would be expected to give rise to very small particles undetectable by the methods employed.

27141

APTIC NO. 48734

Sprigg, William A. and W. E. Reifsnyder

SOLAR-RADIATION ATTENUATION THROUGH THE LOWEST 100 METERS OF AN URBAN ATMOSPHERE. *J. Geophys. Res.*, 77(33):6499-6507, Nov. 20, 1972. 15 refs.

Solar-radiation attenuation through the lowest 100 m of an urban atmosphere was studied. Comparable measurements were made on 3 days within a 9-day period of changes in direct and global solar radiation. The soiling index, temperature, wind, and humidity were measured. The degree of atmospheric pollution ranged widely from below-average to above-average values of sulfur dioxide, suspended particulate mass, and particulate optical density (transmissivity of tape sample). Normal-incidence pyrheliometers were used to measure total spectrum and selected spectral bands of the direct solar beam. Simultaneous measurements were taken over a vertical distance of 100 m between roof top and street level sites. Attenuation coefficients varied with the spectral band selected and with pollutant loading. Significant depletion of the direct-beam component was measured, the total spectrum attenuation coefficients varying between 0.05 and 0.04/km. Direct and scattered total short-wave radiation was measured simultaneously by roof top pyranometers. Measurements indicated that the loss of global radiation was 20-25% of the measured attenuation in the direct beam. (Author abstract modified)

27142

APTIC NO. 48886

Swartman, R. K. Vinh Ha, Michel Julien, and D. J. Whitney

THE SOLAR ERA. PART 5--THE POLLUTION OF OUR SOLAR ENERGY. *Mech. Eng.*, 94(12):23-26, Dec. 1972. 9 refs.

The extreme consequences of unchecked atmospheric pollution could be massive carcinogenic ultraviolet radiation, melting of polar ice caps, or another ice age. Pollutants such as carbon dioxide, water vapor, and solid particles could affect the amount of solar radiation reaching Earth; it is not clear whether more radiation would be reflected back into space with the overall effect of lowering the mean temperature of Earth, or whether more radiation would reach Earth with a consequent increase in the mean temperature. Pollutants such as nitrogen oxides and sulfur oxides would alter the quality rather than the quantity of solar radiation by initiating processes capable of removing ozone from, or adding it to, the atmosphere. The present ozone layer at 10-20 miles above earth is a natural filter for ultraviolet radiation. Accurate worldwide and long-term measurements of solar radiation are needed to formulate hypotheses concerning the future of the environment.

27143

APTIC NO. 48507

Udagawa, Mitsuru, Saburo Fukuoka, Masanao Funashima, Masashi Ito, and Toshio Ohira

METEOROLOGICAL FACTORS AND HIGH OXIDANT CONCENTRATION. (Konodo okishidanto to kisho joken ni suite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 307. (Nov. 7-9, Paper 35.)

The south and south-south-east winds prevalent in Tokyo during the summer cause high oxidant concentrations in the western suburbs of Tokyo. This is clearly different from the sulfur dioxide pollution pattern. Relatively strong winds seem to bring high oxidant concentrations in general. For instance, high oxidant concentrations appear in the Kojiya district when the wind is 3 to 4.9 m/sec, and in Hachioji when the velocity is 5 to 5.9 m/sec. The relationship between atmospheric stability and high oxidant concentration was investigated for the 59 days between 1967 and 1970 when high concentrations appeared. A clear inversion layer phenomenon appeared on 39 days out of 59 days, and the average altitude of the inversion layer was 920 m. Photochemical smog tends to appear when there is a very stable layer in the area of 1000 m altitude. There is no clear pattern in the relationship between the sea breeze front and oxidant. No clear-cut explanation could be obtained by the theory of moving air currents.

27144

APTIC NO. 48631

Warburton, Joseph A. and Lawrence G. Young

DETERMINATION OF SILVER IN PRECIPITATION DOWN TO 10(-11) M. CONCENTRATIONS BY ION EXCHANGE AND NEUTRON ACTIVATION ANALYSIS. *Anal. Chem.*, 44(12):2043-2045, Oct. 1972. 8 refs.

Thermal neutron activation analysis was used to determine the concentration of silver in precipitation. The reaction $\text{Ag}(109) (n, \gamma) \text{Ag}(110)$ was used; the determinations were made by gamma-ray spectrometry using the 24-second half-life $\text{Ag}(110)$ radioisotope. The silver content of precipitation in the eastern Sierra of the United States was generally in the concentration range of 2 to the 6th power times 10 to the -11th power M. This natural background concentration of silver increased by a factor of 10 east to the Rockies. Samples collected in mountainous areas where silver iodide is released for weather modification purposes contained silver in concentrations as much as 2 times 10 to the -7th power M. To detect silver at these low concentrations, sample enrichment by ion exchange was used prior to activation. (Author abstract modified)

27145

APTIC NO. 48982

Wilkins, Eugene M.

VARIATIONALLY OPTIMIZED NUMERICAL ANALYSIS EQUATIONS FOR URBAN AIR POLLUTION MONITORING NETWORKS. *J. Appl. Meteorol.*, 11(8):1334-1341, Dec. 1972. 10 refs. (Presented at the Weather Forecasting and Analysis Conference, 4th, Portland, Ore., May 1-4, 1972.)

Formulas were derived, and their characteristics examined, for the purpose of optimizing objectively contoured patterns of air pollution concentrations where the diffusion equation is used as a dynamical constraint in the interpretation of network observations. The low-pass filter characteristics of the method were demonstrated. An adjustment routine equation was derived for optimally correcting continuity discrepancies between successive isopleth patterns, such as might be computed for an automatic display system. Analytical expressions were obtained which predict the degree of improvement expected in practical applications where discrepancies occur in the analysis due to the natural periodic concentration variations which occur at monitoring stations. A sample calculation showed that the mean square residual error over a region can be reduced to less than 10% of its original magnitude when the adjustment routine is applied with a realistic set of meteorological parameters. Adjustment routines can be programmed into a computerized objective analysis method, and thus be applied with a high degree of automation and efficiency. (Author abstract)

27146

27146

APTIC NO. 48735

Yamanaka, Shinichi, Kai Hirose, and Senzo Kawai

MEASUREMENT OF OZONE BY 1,2-DI-(4 PYRIDYL) ETHYLENE METHOD BESIDE ROADS. (1,2-ji(4-pirijiru) echiren ho ni yoru dorozoi ni okeru ozon no sokutei). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 265. (Nov. 7-9, Paper 219.)

Some basic data for photochemical smog were collected by measuring ozone, oxidants, nitric oxide, and nitrogen dioxide on several busy highways in Kyoto. Ozone was measured by the 1,2-diethylene method; the total oxidant was continuously measured by neutral potassium iodide colorimetry; and NO and NO₂ were measured by the Saltzman meter. The ratio of ozone to oxidants was 70% at most, and when limited, only 11%. The amount of peroxyacetyl nitrate and other organic peroxides was extremely small; the equation ozone is total oxidants minus A(NO₂) minus B(NO) can be used. Eliminating clearly inadequate figures, averages of A and B were obtained by this equation. A was 0.39 and B was 0.10. Substituting A and B with these indexes, ozone quantity was obtained from the total oxidant measurements and compared with the actual measurements. They did not always agree but sufficed to obtain an approximation of ozone concentration. The daily fluctuation pattern of total oxidant was examined on the roof of a building and on the road. The former showed a typical photochemical oxidant pattern, but the latter did not. The measurements of total oxidant on the road are not appropriate for forecasting photochemical oxidant.

27147

APTIC NO. 48588

Yoshida, Katsumi, Motohide Murata, Teruyuki Tsujikawa, Masayoshi Kitabatake, and Hozumi Tamura

ATMOSPHERIC DISPERSION CALCULATION IN YOKKAICHI AREA. (Yokkaichi chiiki ni okeru taiki kakusan keisan ni tsuite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 285. (Nov. 7-9, Paper 239.)

The 1971 average concentration of sulfur oxides in Yokkaichi was calculated by a trial diffusion equation and the result was compared with the actual measurement. The emission sources were 388 stacks on 268 plant sites. The records of emission quantity per stack (g/sec), and of the wind direction and velocity for the same period were used. The effective stack height was calculated by the Holland method. The Pasquill I equation was modified by replacing the volume average in order to get a long-term average concentration, and equation II results were examined in the form of the Sutton dispersion parameters. This method shortened the computer calculation time by approximately 2/3. Correlation of the calculation by this trial equation and the actual measurements showed that the use of the equation was appropriate.

1971

27148

APTIC NO. 18348

McElroy, James L.

A NUMERICAL MODEL OF THE NOCTURNAL URBAN BOUNDARY LAYER. Preprint, Office of Air Programs, Research Triangle Park, N. C., Div. of Meteorology, 8p., 1971. 15 refs.

A cross-sectional numerical model to simulate the thermal structure of the envelope of air within the nocturnal urban boundary layer is developed from a formulation due to Estoque. In the model, information on the sub-surface thermal properties and moisture content, aerodynamic surface roughness, and heat energy resulting from man's activities is incorporated at finite intervals as air of rural origin traverses a metropolitan area. Specifically, for stable meteorological conditions in the upwind rural area, the model predicts the development of a surface-based thermal boundary layer in the

AIR POLLUTION ABSTRACTS, MAY 1973

upwind suburban district. The layer increases in depth into the central downtown area. Beyond the downtown sector, air restabilizes, beginning at the surface. Above this stable layer, advection of warmer urban air is predicted to occur somewhat in the manner of a giant heat plume. Downwind of the urban area, the thermal structure approaches that of the upwind rural environs, except for the zone occupied by the heat plume. The model is tested against experimental data collected over Columbus, Ohio, during September 1968 and March 1969. The numerical simulations agree well with the measured data with respect to the detailed spatial form of the thermal boundary layer across the city.

BASIC SCIENCE AND TECHNOLOGY

1973

27149

APTIC NO. 49055

Bonczyk, P. A.

PRESSURE BROADENING OF MAGNETICALLY-TUNED INFRARED ABSORPTION SPECTRUM OF NO USING A CO LASER. Chem. Phys. Letters (Amsterdam), 18(1):147-149, Jan. 1, 1973. 13 refs.

The spectrum which corresponds to the absorption of carbon monoxide laser light by magnetically tuned nitric oxide was studied as a function of NO and foreign gas pressure. The values obtained for self and foreign-gas (nitrogen, oxygen, carbon monoxide, and helium) broadening of the spectrum in units per (cm times 10 to the 5th)/torr were: NO-NO, 15.7; NO-N₂, 3.5; NO-H₂, 3.2; NO-CO, 2.3; and NO-He, 1.7. (Author abstract modified)

27150

APTIC NO. 48827

Kirchner, Kurt, Hubert Kastenhuber, Harald Koch, and Hans Kral

KINETICS OF GAS REACTION IN THE PPM RANGE. ENVIRONMENTAL SIGNIFICANCE. (Kinetik von Gasreaktionen im ppm-Bereich. Bedeutung fuer den Umweltschutz). Text in German. Chem.-Ing.-Tech., 45(1):30-36, Jan. 1973. 18 refs. (Presented at the Dechema-Festkolloquium zur Verleihung des Max-Buchner-Preises, Frankfurt, West Germany, Nov. 19, 1971 and 1970.)

The importance of kinetic studies on reaction systems in which air contaminants are present in low concentrations for purification of waste gases and deodorization, as well as on the processes occurring in the polluted atmosphere is discussed. Two specific examples are also presented, the first one is the reaction of mercaptans with ozone. The measurements were performed in a flow reactor. A second order rate constant was found for the initial rate. The rate constant increased with increasing chain length. Aldehydes and disulfides were the main products. The second reaction is the oxidation of hydrocarbons considered for the example of an ethylene/air mixture in a honeycomb catalyst (aluminum oxide impregnated with platinum). In the diffusion range the experimental results agreed to a first approximation with the theory of Seifert and Schmidt, provided that the concentration was sufficiently small.

27151

APTIC NO. 48992

Unland, Mark L.

ISOCYANATE INTERMEDIATES IN AMMONIA FORMATION OVER NOBLE METAL CATALYSTS FOR AUTOMOBILE EXHAUST REACTIONS. Science, 179(4073): 567-569, Feb. 9, 1973. 10 refs.

The chemistry of nitric oxide reduction in automotive exhaust gas and the study of the infrared spectra of species adsorbed on the surface of noble metal catalysts are discussed. Iso-

cyanate species were detected on the surface of noble metal catalysts during the reactions of carbon monoxide with nitric oxide. The intensity of the surface isocyanate infrared band correlated with the known ammonia-forming tendencies among the noble metals. The discovery of the isocyanate species suggests a new mechanistic pathway to the ammonia formed during catalytic reduction of nitrogen oxides in automobile exhaust. The spectrophotometric experimental procedure was described. Spectra were obtained for ruthenium, rhodium, palladium, iridium, and platinum.

1972

27152

APTIC NO. 48957

Al Omar, A. F. and F. Bakhtar

COMBUSTION PROBLEMS IN THE PETRO-FORGE.

Heat Fluid Flow, 2(1):9-22, April 1972. 12 refs.

The combustion of suspensions of liquid fuels in cold compressed air was investigated. Data included measurements of air swirl in the chamber and the characteristics of a fully developed spray. The effects of spray size and penetration on the process were studied. The suspension was capable of combustion, provided the particles were sufficiently small; theoretical calculations of the critical drop diameter provided an indication of the optimum particle size. Best results were achieved when the fuel was injected tangentially into the air stream, and reliable combustion was effected over a wide range of air/fuel ratios, using gasoline, diesel fuel, kerosene as fuel in the basic standard chamber. (Author summary modified)

27153

APTIC NO. 48501

Asakuno, Kunihiro, Tomoko Nagata, Tomio Hirono, and Toshio Ohira

SIZE SPECTRUM OF SUB-MICRON PARTICULATES IN THE AIR. (*Sabumikuron ryushi no seijo ni tsuite*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 104. (Nov. 7-9, Paper 59.)

Aerosol particles larger than 0.005 micron were counted using special equipment, and the relationship of the number of particles with the formation of ozone, oxidants, and photochemical smog was examined. The test air containing particles was compressed and atomized. From the amount of light absorbed, the number of particles could be determined. At the same time, a digital dust counter, a high-volume counter, and a low-volume counter were used for a general analysis. At the time of high oxidant concentrations with active photochemical reactions, aerosol concentrations were high, between 10,000 and 30,000 particles/cc. The particle sizes were 0.01 to 0.05 micron. Concentrations changed drastically in a short period of time, and the reaction occurred within a relatively small area.

27154

APTIC NO. 48610

Bjerle, I., S. Bengtsson, and K. Farnkvist

ABSORPTION OF SO₂ IN CaCO₃-SLURRY IN A LAMINAR JET ABSORBER. *Chem. Eng. Sci.*, 27(10):1853-1861, Oct. 1972. 7 refs.

A laminar jet reactor was used to examine the mass transfer coefficients in the gas and liquid phases of the sulfur dioxide-nitrogen system and the absorption of SO₂ in a calcium carbonate slurry. In the gas phase, mass transport closely followed the penetration model. The rate of absorption of SO₂ in the CaCO₃ slurry was slightly greater than in water probably due to the reaction between SO₂ and the carbonic acid radical. (Author abstract modified)

27155

APTIC NO. 48707

Chattopadhyay, A. and R. E. Jervis

DETERMINATION OF NANOGRAM QUANTITIES OF LEAD BY PHOTON ACTIVATION ANALYSIS.

Radiochem. Radioanal. Lett., 11(6):331-341, Oct. 20, 1972. 11 refs.

An analytical method was developed for the determination of nanogram quantities of lead and was tested on samples of soils. Photon activation analysis consists of irradiating environmental samples in a high-flux 35 MeV bremsstrahlung beam and determining the lead content instrumentally with a Ge/Li detector using the 0.899 and 0.911 MeV gamma-rays of 67-m-204m Pb. Samples containing less than 1.5 ppm of lead require chemical separation after activation and counting with a NaI/Tl detector for the 0.279 MeV gamma-ray of 52.1-h-203 Pb. (Author abstract modified)

27156

APTIC NO. 48753

Christmann, K. and G. Ertl

ADSORPTION OF CARBON MONOXIDE ON SILVER/PALLADIUM ALLOYS. *Surface Sci.*, 33(2):254-270, Nov. 1972. 42 refs.

The adsorption of carbon monoxide on epitaxial planes of silver/palladium alloys with definite surface compositions were studied by means of LEED, Auger electron spectroscopy, and work function measurements. The formation of ordered adsorbed structures was prevented by even small amounts of silver in the surfaces. The maximum variation of the work function with CO adsorption had a complex relationship to the surface composition. The isosteric heats of adsorption were evaluated from the measured adsorption isotherms. For CO adsorption on pure palladium planes, the adsorption energies were either constant or they decreased slowly up to high coverages, whereas a continuous decrease was observed with the alloys, indicating energetical heterogeneity. Experimental results, the nature of CO chemisorption, and the electronic structure of silver/palladium alloys were discussed. (Author abstract modified)

27157

APTIC NO. 48866

Dixon, Jean P.

THE DETERMINATION OF SULPHUR IN LUBRICATING OIL FRACTIONS AND IN FUEL OILS - A COULOMETRIC METHOD. *Analyst (London)*, 97(1157): 612-619, Aug. 1972. 6 refs.

The modification of the combustion-microcoulometric method, used for the determination of trace amounts of sulfur in organic liquids, is discussed. The inlet to the microcoulometer was re-designed to permit complete combustion of oils to take place in the inlet. The modified inlet and flow system were used for the determination of sulfur in oil fractions obtained from preparative layer chromatography and in fuel oils. The modified procedure developed for less volatile products is reviewed. The experimental apparatus, procedure, and calculations are presented. Operating conditions of the microcoulometer for sulfur (oxidative) determinations, and of the modified procedure are listed. The sulfur content of gasolines, gasoline blending components, and light distillate fuels, determined by X-ray fluorescence and coulometry, and of aromatics, and diluted heavy fuel oils are presented.

27158

APTIC NO. 48612

Fortin, C. J., D. R. Snelling, and A. Tardif

THE ULTRAVIOLET FLASH PHOTOLYSIS OF OZONE AND THE REACTION OF O(1D) WITH H₂O. *Can. J. Chem.*, 50(17):2747-2760, Sept. 1972. 42 refs.

The decomposition of gas mixtures containing ozone was studied following a short duration ultraviolet pulse. The relative rate of the metastable singlet D state reaction with water and nitrogen was derived from an analysis of the O₃ decomposi-

tion curves for O₃:N₂ and O₃:H₂O. Less than 6% of the O₂, formed directly by photolysis, was in the singlet sigma state. The water catalyzed decomposition of O₃ was also studied. (Author abstract modified)

27159

APTIC NO. 48864

Hendricks, C. D. and S. Babil

GENERATION OF UNIFORM, 0.5-10 MICRON, SOLID PARTICLES. *J. Physics E*, 5(9):905-910, Sept. 1972. 16 refs.

A method is described for the generation of large quantities of uniform solid particles of 0.5-10 micron radius. The particles were produced by the evaporation of the solvent content of liquid droplets of a solution sprayed in the air and driven down a high temperature evaporation column. The generation of the drops was accomplished by the electrochemical excitation of unstable capillary waves on the surfaces of liquid jets issuing from capillary tubes, resulting in the breakup of the jets into uniform drops. This method allows the routine generation of droplets of 10-300 micron radius at rates of up to 400,000 droplets/sec/capillary. The obtained particles are spherically shaped polycrystalline structures of solute material. Particle sizes correspond to the initial concentration of solute in the solution droplets, implying nearly complete evaporation of the solvent constituent. A theoretical explanation is made of the evaporation process and the subsequent solute recovery. Experimental procedures and equipment are described. (Author abstract modified)

27160

APTIC NO. 48502

Kasahara, Mikio, Kanji Takahashi, and Michiharu Takahashi

AEROSOL FORMATION FROM PHOTOCHEMICAL OXIDATION OF SULFUR DIOXIDE. (SO₂ no kokagaku-teki sanku ni yoru arozoru seisei). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 56. (Nov. 7-9, Paper 4.)

The mechanisms and characteristics of the photochemical oxidation of sulfur dioxide into aerosol particles of sulfuric acid mist were examined. Standard SO₂ gas was added to clean air and was divided into five cylinders. A blacklight irradiation was given. Using the ultraviolet ray strength as a parameter under the conditions of 24.8 ppm of SO₂, 91 to 95% humidity, and 15 C temperature, the measurements of condensation nuclei were taken. Also, using the SO₂ concentration as a parameter, under the same conditions, and 1.2 mw/sq cm of ultraviolet rays, measurements were taken. The formation of aerosol sulfuric mist did not depend so much on SO₂ concentration. After a certain amount of irradiation, the aerosol concentration reached a plateau.

27161

APTIC NO. 48891

Kato, Tatsuo, Tadashi Ito, Yoshimichi Hanai, and Meiko Sugiyama

RESEARCH OF PHOTOCHEMICAL SMOG MATERIALS. NO. 4: FORMATION OF ACROLEIN FROM AROMATICS BY PHOTOCHEMICAL REACTION. (Kokagaku sumoggu genin no chosa kenkyu, sono 4, kokagaku hanna ni yoru hokozoku kara akuroroin no seisei). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 75. (Nov. 7-9, Paper 23.)

Experiments were conducted to see whether acrolein is formed from aromatic hydrocarbons; it was confirmed. Hydrocarbons were prepared in pyrex glass containers and irradiated by a xenon lamp, blacklight, or sunshine. A small amount of nitrogen oxides or ozone was added. After changing the conditions in various ways, benzene and xylene did not produce acrolein, but toluene did, sometimes in a large quantity. However, the presence of nitrogen oxides was necessary for this reaction to happen. The amount of nitric oxide affected the reaction, and if there was an excessive amount, it

AIR POLLUTION ABSTRACTS, MAY 1973

impaired rather than helped the formation of acrolein. The reaction was effective when oxygen and/or nitrogen dioxide was added from the beginning. Ozone sometimes produced similar effects, but its presence was not absolutely necessary. The reaction was more easily produced by the xenon lamp or sun, rather than the blacklight. In the process, nitrotoluene was formed; paranitrotoluene formed acrolein easily with the help of solar radiation.

27162

APTIC NO. 48641

Klutsch, G. and S. Fliszar

QUANTITATIVE INVESTIGATION OF THE OZONOLYSIS REACTION. XVII. RELATIVE REACTION RATES FOR THE OZONE ATTACK ON PHENYLETHYLENES. *Can. J. Chem.*, 50(17):2841-2844, Sept. 1972. 8 refs.

The substituent effects on the relative rates of ozonolysis of selected ring-substituted phenylethylenes were studied. The relative rate constants for the reaction of ozone with the phenylethylenes in carbon tetrachloride solution obeyed Hammett's equation; non-conjugating beta-substituents affected the rate constants in Taft's equation. The results were used to illustrate the electrophilic mode of attack of ozone. (Author abstract modified)

27163

APTIC NO. 48703

Kroetzsch, Peter

PRESSURE DROP AND AVERAGE PARTICLE VELOCITY IN STEADY-STATE GAS/ SOLID FLOW IN A VERTICAL PIPE. (Druckverlust und mittlere Partikelgeschwindigkeit bei stationärer Gas/Feststoff-Stromung im senkrechten Rohr). Text in German. *Chem. Ing.-Tech.*, 44(24):1354-1360, 1972. 16 refs.

Extensive systematic measurements have led to the establishment of correlations for round test materials in hydraulically smooth pipes which have a wide range of validity. The significant dimensionless quantities were derived from a conceptual model. Additional systematic measurements are necessary outside the range of validity. Calculation of the average particle velocity and the pressure drop for steady state flow should also be possible for large pipe diameters encountered in practice provided that the operating conditions lie within the given range of validity.

27164

APTIC NO. 48582

Laktionov, A. G. and Yu. P. Bogomolov

THE SIZE OF PARTICLES OF NATURAL AEROSOLS AS A FUNCTION OF AIR HUMIDITY. *Bull. Acad. Sci. USSR Phys. Atmos. Oceans* (English translation from Russian of: *Izv. Akad. Nauk SSSR, Fiz., Atmosfery i Okeana*), 8(3):165-268, March 1972. 10 refs.

The changes that take place in the particle size distribution of natural aerosols upon a decrease in relative humidity were investigated with a humidifying chamber, a drying chamber, and a photoelectric aerosol particle concentration and size meter. The particle size decrement following a decrease of humidity from 70-30% was found. Changes in dry particle concentrations during the 35-day measurement period were two to two and a half times greater than the changes in aerosol microstructure at different relative humidities. Thus, variations in dry aerosol particles can mask the aerosol variation with humidity.

27165

APTIC NO. 48520

McKinney, C. M.

SULFUR PRODUCTS VS. CRUDE OIL. *Hydrocarbon Process.*, 51(10):117-120, Oct. 1972. 8 refs.

Distribution charts were devised to show the sulfur content of distillates and residues prepared from crude oils of known sulfur content. One group of charts illustrates the relationship between sulfur content and distillation data to 787 F. A

separate group is used for residues above 787 F. Sulfur and distillation data for the 43 crude oils that were analyzed are reported in tables that can be used to construct similar distribution charts for the crude oils not illustrated. Data for 41 of the crude oils show that the sulfur content of residue above 787 F can be estimated when the API gravity and sulfur content are known for the crude oil from which the residue was prepared. The accuracy of the estimation is a function of the API gravity of the crude oil, varying from plus or minus 20% at 10 deg API to plus or minus 8.3% at 38 deg API.

27166

APTIC NO. 48681

Monahan, K. and T. S. Wauchon

CROSS SECTIONS FOR THE PRODUCTION OF EXCITED PRODUCTS IN THE PHOTOIONIZATION OF N₂, O₂, CO, AND N₂O BY 58.4-NM RADIATION. *J. Geophys. Res.*, 77(31):6262-6265, Nov. 1, 1972. 23 refs.

Fluorescent radiation caused by the interaction of 58.4-nm radiation with nitrogen, oxygen, carbon monoxide, and nitrous oxide was observed spectroscopically between 200 and 750 nm. Absolute cross sections were obtained for each of the electronically excited products by comparison with previously measured yields from carbon dioxide. Measurements were compared with those obtained by photoelectron spectroscopy. No detectable emission was observed from water, methane, acetylene, ethylene, nitrogen dioxide, or ammonia. (Author abstract modified)

27167

APTIC NO. 48973

Novitskiy, N. V., G. I. Khromykh, and N. P. Lopayeva

THERMOTECNOLOGICAL CHARACTERIZATION OF EKIBASTUZ COAL (FROM SECTION 5/6) AS A FUEL FOR GIANT BLOCK ELECTRIC POWER PLANTS. (*Teplotekhnicheskaya kharakteristika ugley Ekibastuzskogo mestorozhdeniya (razrez 5/6) kak topliva dlya moshchnykh blochnykh elektrostantsiy*). Text in Russian. *Teplotekhnika*, (12):45-48, 1972. 17 refs.

Chemical and thermotechnological properties of Ekibastuz coal to be used as fuel for giant block electric power plants were studied. The volatile content ranges from 26.6 to 32%, the average ash content being 43.6%. Ash analyses revealed 62.3% silica, 33.3% alumina, 2.0% ferric oxide, 0.4% calcium oxide, 0.4% magnesia, 0.4% phosphorus pentoxide, 1.2% titanium dioxide, 0.5% potassium oxide, 0.1% sodium oxide, less than 0.1% manganous oxide, and, in a few samples, traces of sulfur trioxide. The sulfur content of the coal is 1%.

27168

APTIC NO. 48894

Omata, Hirokazu and Lee F. Brown

USING THE DUSTY GAS DIFFUSION EQUATION IN CATALYST PORES SMALLER THAN 50 Å RADIUS. *Am Inst. Chem. Engrs. J.*, 18(5):967-975, Sept. 1972. 36 refs.

The diffusion and bulk transport of gases and liquids within porous materials can be of critical importance in catalysis, adsorption, and separation processes. When the dusty gas diffusion equation is applied to materials containing pores with radii below 50 Å, the observed diffusion behavior in these smaller pore systems can be quite different from that predicted. Higher temperatures and pressures tend to lessen the deviations between prediction and experiment. The observed deviations are probably caused by surface transport and momentum transfer between gas molecules and pore walls during molecular flight. For bimodal materials, an additional factor can be the inapplicability of the equation to systems of parallel micro and macropores. Excellent agreement between theory and experiment occurs for large-pore unimodal systems. (Author abstract modified)

27169

APTIC NO. 48972

Pal, Sandor

USE OF THERMOGRAPHY IN HUNGARY. (*A termografia alkalmazása Magyarországon*). Text in Hungarian. *Energiagazdalkodás*, 13(12):529-538, Dec. 1972.

Principles and uses of a Swedish AGA Thermovision thermograph (a self-recording thermometer) in trouble-shooting at a thermal power plant in Hungary are described. Delivery processes in a fly ash delivery tank, heat insulation, and flow dynamics in dry cooling towers were investigated. The thermograph is suitable for the detection at a minimum temperature difference of 0.1 C against reference standard.

27170

APTIC NO. 48659

Penkett, S. A.

OXIDATION OF SO₂ AND OTHER ATMOSPHERIC GASES BY OZONE IN AQUEOUS SOLUTION. *Nature Phys. Sci.*, 240(101):105-106, Dec. 4, 1972. 14 refs.

The oxidation of atmospheric gases to form aerosols is an important part of atmospheric chemistry. For many years it has been claimed that most of the sulfur dioxide is oxidized in droplets which are present in clouds and fogs. Calculations of the extent of this process have always been made assuming that oxygen is the oxidizing agent; however ozone could also be an oxidizing agent. The reaction rates of ozone dissolved in water with sulfur dioxide, nitrogen dioxide, and hydrogen sulfide were therefore studied using a stopped-flow apparatus with spectrophotometric detection at 265 nm. Straight lines observed in first order analysis for the decay of ozone in solution showed that the reducing agent concentration was at least five times greater than the O₃ concentration. Therefore, the reactions were first order for NO₂ and SO₂ with respect to O₃ and to the reducing agent. If the SO₂ concentration is 20 micrograms/cu m, then the concentration of HSO₃(-) ions in the droplets at pH 5 is 10 to the -5 power M, and 3.8/micrograms sulfate will be produced/g water in the cloud. This is equivalent to an oxidation rate of 12.6%/hr, 70 times larger than the rate calculated for atmospheric oxygen. There is a close correlation between nitrate and sulfate levels in the atmospheric aerosol. The oxidation of H₂S is very rapid, but the solubility of H₂S in water is four times lower than SO₂ at the concentrations of these gases in the atmosphere. Therefore, the overall rate of production of sulfate by this mechanism is very small.

27171

APTIC NO. 48609

Senzaki, Kiyoshi and Koji Kawasaki

ADSORPTION AND DISSOCIATION OF CO ON TUNGSTEN SURFACE STUDIED BY FIELD-EMISSION MICROSCOPY. *Jap. J. Appl. Phys.*, 11(9): 1363-1371, Sept. 1972. 17 refs.

The adsorption and thermal desorption of carbon monoxide on tungsten were studied by field-emission spectroscopy to determine the location dependence of the CO binding states. One weakly held alpha state formed only at high coverage of CO was uniformly distributed; CO in the alpha state was found on all the planes of tungsten. The beta states depended on the surface structure. The dissociation of CO after adsorption at above 600 C was also studied. (Author abstract modified)

27172

APTIC NO. 48766

Smutek, M.

ON THE SEPARATION OF AIR-BORNE PARTICLES BY DIFFUSION. *Aerosol Sci.*, 3(5):337-343, Sept. 1972. 6 refs.

The problem of diffusional separation of air-borne particles on the walls of a cylindrical channel for laminar flow was solved for the general case of finite diameter of particles with allowance for the slipping of gas on the walls. Limitations of the solution, model design and application, and the mathematical parameters are defined. (Author abstract modified)

27173

APTIC NO. 48685

Tan, Hiok-Seng and F. W. Lampe

THE REACTION OF ETHYL RADICALS WITH NITRIC OXIDE. NITROSOETHANE AND TRIETHYLHYDROXYLAMINE FORMATION. *J. Phys. Chem.*, 76(23): 3303-3311, Nov. 9, 1972. 37 refs.

Ethyl radicals, formed by photolysis of azoethane, reacted with nitric oxide by successive addition to yield nitrosoethane and triethylhydroxylamine. Nitrosoethane was the only product until the nitric oxide concentration was reduced to very low levels, then the addition reaction to form the triethylhydroxylamine took place in competition with the combination and disproportionation reactions of ethyl radicals. In the absence of ethyl radicals, or in experiments with initial nitric oxide concentrations above 6%, the dimerization of nitrosoethane was observed. Kinetic analysis of the data subsequent to depletion of nitric oxide afforded an evaluation of specific reaction rates for the addition of ethyl radicals to monomeric nitrosoethane and for the reversible dimerization of monomeric nitrosoethane. The ionization potential of monomeric nitrosoethane was determined from a study of the photolytic growth rate dependence of $C_2H_5NO(+)$ on electron energy. (Author abstract)

27174

APTIC NO. 48970

Vlasyuk, O. I.

STUDYING THE PROCESS OF HYDROCARBON ABSORPTION IN NATURAL GAS FLOW. (*Issledovaniye protsessy absorptsii uglevodorodov v potoke prirodnogo gaza*). Text in Russian. *Neft. Gazov. Prom.*, no. 5:45-48, May 1972. 3 refs.

The process of C5 hydrocarbon absorption from natural gas was studied on a pilot plant. Isobaric absorption is done by means of 15-16 cu cm of 96.5%-diethylene glycol plus 13-15 cu cm of 170 C petroleum fraction/N cu m of natural gas. Desorption in column is applied after about 1,500,000 cu m of gas is processed. The stable condensate obtained is removed from the gas quantitatively, the residue is 1.5%. It is possible by this method to lower the dew point from 16-17 C to -2 to -4 C for moisture, and from 20-21 C to 1.5-3 C for C5 hydrocarbons. The gas loss due to the degasification of the saturated absorbents is 800 N cu m per day, and another amount of 900 N cu m/day is required for warming the saturated absorbent.

27175

APTIC NO. 48574

Watanabe, Fujio, Shigeru Yanagase, and Sachio Sugiyama

MANUFACTURE OF GRANULAR ACTIVATED CARBON FROM BITUMINOUS COAL IN A BATCH TYPE FLUIDIZED BED BY THE STEAM ACTIVATION METHOD. (*Sekitan o genryo to suru kaibunshiki ryudo fukatsu ni yoru kyukei kasseitan no seizo*). Text in Japanese. *Nippon Kagaku Kaishi (J. Chem. Soc. Japan)*, (12):2313-1317, Dec. 1972. 5 refs.

Granular activated carbon was manufactured from bituminous coal in a batch-type fluidized bed by the steam activation method. Coal 3 mm in diameter was used for samples, and the carbonization and activation temperatures were 550 C and 850 C, respectively. Sample particles were fluidized by nitrogen gas to increase the linear velocity to 1.1 m/sec. Relationships between the surface area and benzene adsorption, and the surface area and methylene blue decoloration power were studied. Pore size distribution of the activated carbon was measured, the data indicated that the proportion of micro-pores in the total surface area reached over 90%. Fluidized bed activation was compared with fixed-bed activation in relation to total surface area, void fraction, and activation time. The fluidized bed activation method is preferable to the fixed-bed method both for its efficiency of activation and the physical properties of the manufactured activated carbon.

27176

APTIC NO. 48544

Westberg, H. H. and R. A. Rasmussen

ATMOSPHERIC PHOTOCHEMICAL REACTIVITY OF MONOTERPENE HYDROCARBONS. *Chemosphere*, 1(4):163-168, July 1972. 11 refs.

The reactivity of monoterpene hydrocarbons (10 ppb) in the presence of nitric oxide (7 ppb) and light corresponding to natural sunlight was studied by gas chromatography. Reactivity increased in the order of saturated, aromatic, and olefinic monoterpenes. All olefinic members were very reactive, although increased substitution on the double bond facilitated the reaction. The results indicate that olefinic hydrocarbons released to the atmosphere by plants will have a short residence time.

27177

APTIC NO. 48632

Willis, C., A. W. Boyd, and P. E. Bindner

A POSITIVE-ION REACTION MECHANISM FOR THE RADIATION INDUCED OXIDATION OF CARBON MONOXIDE IN THE HIGH DOSE RATE RADIOLYSIS OF CO-O₂ MIXTURES. *Can. J. Chem.*, 50(21):3508-3514, Nov. 1, 1972. 44 refs.

The high dose rate radiolysis of carbon monoxide-oxygen mixtures was studied by irradiation of the mixtures with single pulses of electrons. A positive chain oxidation of CO occurred. The carbon dioxide yields at 2 times 10 to the 27th power eV/g/sec were large $G(CO_2)$ equals 15 + or minus 1 between 20 and 60% O₂. These decreased by approximately 50% at 10 to the 28th power eV/g/sec. Although the results were somewhat irreproducible, the addition of perfluorocyclobutane, an electron scavenger, increased these CO₂ yields at both dose rates by up to a factor of 15. They were reduced to $G(CO_2)$ less than 2 by the addition of positive ion scavengers. These results were consistent with a chain reaction similar to that proposed for low dose rate studied involving O₂(+), CO₃(+), and CO₂(+) as chain carriers. The ozone yields were consistent with a total oxygen atom yield of $G(O)$ equals 1.4 in pure CO from neutral processes. (Author abstract modified)

27178

APTIC NO. 48842

Yasuoka, Takashi and Shunro Mitsuzawa

THE EFFECT OF HUMIDITY ON NITRIC OXIDE AND NITROGEN DIOXIDE. (*Issanka chisso, nisanka chisso to shitsudo to no kankei*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 256. (Nov. 7-9, Paper 210.)

Experiments were conducted on the behavior of nitric oxide and nitrogen dioxide in the presence of humidity and in the absence of solid oxidizing agents. The NO was sent into a gas chamber furnished with a heater, stirrer, and ultraviolet ray lamp, and the amount of NO and NO₂ were continuously measured. Normally, 5 ppm of NO reduces to 4 ppm in 5 hours in a gas chamber. When the relative humidity is less than 10%, the amounts of NO and NO₂ remain the same, but with an increase in humidity, the measurement of NO₂ decreases while NO remains at the same level. In the same experiment, if the temperature is raised and the relative humidity is decreased, the measurement of NO₂ rises again. Humidity does not affect the natural oxidation of NO by ultraviolet rays. The speed of oxidation and decomposition is fast when humidity is low, and slow when humidity is high. These results may be applied to the analysis of the humidity-oxidant relationship in the atmosphere.

EFFECTS-HUMAN HEALTH

1973

27179

APTIC NO. 48938

Markaryan, Kh. S.

ACCUMULATION OF BLOOD METHEMOGLOBIN IN RATS EXPOSED TO VARIOUS CONDITIONS OF ANILINE INHALATION. (*Nakopleniye metgemoglobina v krovi belykh kryz pri razlichnykh rezhimakh ingalyatsii anilina*). Text in Russian. *Gigiena i Sanit.*, no. 12:53-57, 1973. 7 refs.

Tests on the dynamics of blood methemoglobin accumulation in white rats exposed continuously or intermittently to various aniline concentrations are evaluated. The accumulation of methemoglobin in the blood due to continuous inhalation of aniline in concentrations of up to 300 mg/cu m over 6 hr was proportional to the aniline concentration in the air, and linear function of the exposure time, with marked tendency toward steady state. The aniline concentration necessary for methemoglobinemia to appear was dependent on the duration of continuous inhalation, yielding linear concentration-time relationship on logarithmic scale. Tests with intermittent exposures of 24 hr each to 5 mg/cu m-concentrations over 21 days with 2, 6, 12, 18, and 24 hour-pauses between exposures revealed an inverse proportion of methemoglobin accumulation to the length of the intermissions. The reduced rate of methemoglobin formation under intermittent inhalation conditions is apparently due to reduced total dose, to dimethemoglobinization and to adaptation.

1972

27180

APTIC NO. 48693

CAN FLUORIDE CAUSE LUNG CANCER? Fluoride. 5(4):169-171, Oct. 1972. 14 refs.

The possible carcinogenic role of the fluoride ion is discussed, and studies on fluoride emissions in relation to lung cancer are summarized. The results of the studies are necessarily limited, but cannot be discounted. Even if fluorides are not solely responsible for the development of lung cancer, in conjunction with other carcinogens they might act as a synergist. Fluoride is also a constituent of asbestos, a recognized carcinogenic agent, at levels of the order of 70-579 ppm.

27181

APTIC NO. 48519

Baker, Susan P., Russell S. Fisher, William C. Masemore, and Irvin M. Sopher

FATAL UNINTENTIONAL CARBON MONOXIDE POISONING IN MOTOR VEHICLES. *Am. J. Public Health*, 62(11):1463-1467, Nov. 1972. 20 refs.

An investigation was undertaken to determine how many persons die in motor vehicles as the result of unintentional carbon monoxide poisoning, and to develop suggestions for potentially effective countermeasures. Sixty-eight such deaths occurred in Maryland during 1966-1971. Fifty-one of the deaths were associated with faulty vehicles, usually due to rust. Most deaths involved stationary vehicles, with the engine running to provide warmth. Synergism between alcohol and CO was also a factor. Carboxyhemoglobin concentration in the blood of the victims was measured. Carbon monoxide poisoning was not suspected initially in 14% of the cases where the deceased was alone in the car. Suggested countermeasures include modifications to future cars, detection and correction of defects in existing vehicles, and prompt oxygen therapy for victims who are found alive.

27182

APTIC NO. 48885

Baretta, E. E., H. C. Dodd, T. N. Fisher, A. A. Herrmann, M. J. Hosko, P. E. Newton, J. E. Peterson, and R. D. Stewart

WHAT'S NEW WITH MAN'S OLDEST POISON? *Proc. Am. Petrol. Inst., Div. Refining*, vol. 52:121, 1972. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.) (Complete text not available.)

Sedentary human volunteers were exposed to carbon monoxide at concentrations of less than 1, 25, 50, 100, 200, 500, and 1000 ppm for periods sufficient to produce carboxyhemoglobin saturations of 2-23%. Performance was not impaired at COHb saturations less than 12%. Exposures resulting in COHb saturations greater than 15-20% resulted in delayed headaches, changes in the visual evoked response, prolongation of reaction time, and impairment of manual coordination. Exposure to CO had no effect on time discrimination tests. (Author abstract modified)

27183

APTIC NO. 48743

Barnea, M.

CRITERIA FOR SETTING UP STANDARDS OF MAXIMUM ALLOWABLE CONCENTRATIONS OF POLLUTANTS IN THE ATMOSPHERE. (*Kriterien fuer die Aufstellung von Normen maximal zulassiger Konzentration schaedlicher Stoffe in der Atmosphaere*). Text in German. *Z. Ges. Hyg. Ihre Grenzgebiete (Berlin)*, 18(12):887-890, 1972.

For the determination of standards of maximum allowable concentrations of air pollutants, animal experiments, studies of the effects on plants, microorganisms, isolated tissue and plant cultures, and studies of the effects on material are suitable. Epidemiological studies of a population living in polluted areas are particularly valuable. The results obtained from epidemiological studies must be compared with the results of physical chemical, meteorological, biological studies. Uniform standards are preferable because they can be more easily carried into practice.

27184

APTIC NO. 48533

Bingham, Eula, William Barkley, Mary Zerwas, Klaus Stemmer, and Purcell Taylor

RESPONSES OF ALVEOLAR MACROPHAGES TO METALS. I. INHALATION OF LEAD AND NICKEL. *Arch. Environ. Health*, 25(6):406-414, Dec. 1972. 13 refs.

Rats were exposed to soluble and insoluble aerosols of lead or nickel (lead chloride, lead oxide, nickel chloride, and nickel oxide) for 12 hr/day and 6 days/wk for various periods up to several months, except in the case of Pb2O3 which was a continuous exposure. After at least 2 weeks of exposure, the number of alveolar macrophages available as measured by a standard washing procedure was significantly increased with exposure to NiO, significantly decreased with Pb2O3, and not significantly changed with PbCl2 and NiCl2. However, the distribution of sizes of cells in a population washed out was altered with the different exposures. A marked increase in the mucus in the rats exposed to NiCl2 was noted. The histopathologic examination (light microscopy) of the lungs revealed changes after inhalation of both nickel compounds. (Author abstract modified)

27185

APTIC NO. 48833

Blumer, Walter, Rudolf Jaumann, and Theodor Reich

IS AUTOMOBILE TRAFFIC THE PRINCIPAL CAUSE OF CARCINOGENESIS? (*Motorisierung-wichtigste Ursache fuer Krebsentstehung?*) Text in German. *Schweiz. Rundsch. Med.*, 61(16):514-518, April 1972. 14 refs.

In an industrial Swiss village with 3000 inhabitants the overall mortality from cancer between 1959 and 1970 was 75, of which 43 were men and 32 women. The cause of death in eight cases

were bronchial cancer, nine intestinal cancer, nine stomach cancer, seven breast cancer, four cancer of the cervix, five cancer of the ovaries, four cancer of the prostate, three cancer of the respiratory tract, and 26 cases were less common cancers. Statistical comparison of mortality among people living in houses situated along the main road with mortality among inhabitants of the area 400 m from the highway in the same village disclosed that mortality from cancer in the former was nine times higher than in the latter (11% as against 1.2%). The incidence of death from coronary and circulatory diseases among inhabitants along the highway was not significantly higher than in the area free from traffic. Since cancer is a disease of multifactorial etiology, the statistical study took into account and made corrections for differences in age distribution, smoking the effect of other pollutants in the atmosphere, and population density in the two localities. The principal factor in increased incidence of cancer most probably is increased automobile traffic.

27186

APTIC NO. 48651

Bozhkov, S. N., E. I. Yanev, I. H. Mandazhiev, and T. I. Dimitrov

EXPERIMENTAL STUDIES ON THE ALKALI-ACID EQUILIBRIUM IN THE BLOOD GASES UNDER THE CHRONIC ACTION OF LOW CONCENTRATIONS OF LEAD. *Dokl. Bolg. Akad. Nauk*, 25(7):1011-1014, 1972. 10 refs.

Male guinea pigs were divided into three groups of 25 each and exposed to air containing 0.045 + or 0.012 mg/cu m lead for 2, 4, or 6 mo. Eight animals from each group were sacrificed after exposure and examined for changes in indices of alkali-acid balance and blood gas levels. Between the second and six month of exposure, pH decreased from 7.41 to 7.32, buffer bases from 47.90 to 37.00 mEq/l, standard bicarbonate from 22.50 to 19.34 mEq/l, total carbon dioxide from 25.50 to 18.98 mEq/l, actual bicarbonate from 24.38 to 18.25 mEq/l, partial CO₂ pressure in arterial blood from 39.81 to 31.75 mmHg, partial oxygen pressure in arterial blood from 78.50 to 72.42 mmHg, and saturation of blood with oxygen from 95.03 to 91.54%. These changes are indicative of metabolite acidosis and moderate hypoxemia. Only insignificant changes in alkali-acid and blood gas parameters occurred in control guinea pigs.

27187

APTIC NO. 48723

Bryce-Smith, Derek

BEHAVIOURAL EFFECTS OF LEAD AND OTHER HEAVY METAL POLLUTANTS. *Chem. Brit.*, 8(6):240-243, June 1972. 61 refs.

Present lead levels in man (0.2-0.25 ppm in urban adults) are closer to the threshold of potential clinical poisoning (0.3-0.5 ppm) than those for any other toxic chemical pollutant. Even below such conventional clinical thresholds, lead and some other neurotoxic metals, including manganese and mercury, appear capable of producing short-term and long-delayed effects on behavior and intelligence. Evidence for these effects is reviewed. In one study, only one of 20 children treated for lead poisoning before the age of 7 years showed normal progress in cerebral cortex development. The remaining 19 showed behavioral and emotional abnormalities consistent with brain damage. Inmates of two Swiss prisons had abnormally high mean blood lead levels but relatively low urine levels. By promoting lead accumulation in tissues, impairment of urinary excretion of lead could place behaviorally abnormal groups at higher than normal risk of damage from environmental lead, especially if the impairment existed in childhood.

27188

APTIC NO. 48697

Cecilioni, V. A.

LUNG CANCER IN A STEEL CITY. ITS POSSIBLE RELATION TO FLUORIDE EMISSIONS. *Fluoride*, 5(4):172-181, Oct. 1972. 21 refs. (Presented at the International Society for Fluoride Research, Annual Conference, 4th, Hague, Netherlands, Oct. 24-27, 1971.)

AIR POLLUTION ABSTRACTS, MAY 1973

The epidemiology of 300 deaths from primary lung cancer in the industrial steel city of Hamilton, Ontario was studied. A breakdown of the city into zones revealed three different rates directly related to the proximity to the main industrial area, with a high of 65 per 100,000 population in the northeast end close to the steel mills, a low of 12 in the most distant section, and 23 in the intermediate zone. A marked rise in steel production and a corresponding increase in the use of fluorspar flux occurred during the same period (1966-68). Characteristic fluoride damage to vegetation was established, especially in the northeast section. Analyses of vegetation, dust, and human bones determined high levels of content of fluoride, sulfur, and silica. (Author summary modified)

27189

APTIC NO. 48712

Conney, A. H. and J. J. Burns

METABOLIC INTERACTIONS AMONG ENVIRONMENTAL CHEMICALS AND DRUGS. *Science*, 178(4061):576-586, Nov. 10, 1972. 229 refs.

Recent research provides evidence that metabolic interactions can occur among drugs, insecticides, food additives, carcinogenic hydrocarbons, and a variety of environmental chemicals. A common denominator governing these effects is the versatile nature of liver microsomal enzymes that metabolize chemicals with diverse structures and biological activities, and the fact that these enzymes can be stimulated or inhibited by other chemicals administered simultaneously. Enzyme induction may explain tolerance to certain drugs after prolonged exposure to them and the effect of insecticides on fertility in animals. The ability of a drug to stimulate or inhibit the metabolism of another drug may explain some of the side effects that occur in clinical practice. The ability of environmental chemicals to modify drug action requires further investigation. Ethanol, which may be considered an environmental chemical, has been shown to influence the metabolism of some drugs and thus modify their action. Cigarette smoking appears to stimulate nicotine metabolism, lower plasma phenacetin concentration, and induce enzymes in the placenta that hydroxylate benzo(a)pyrene. Minor metabolites may be responsible for adverse reactions to drugs, and these pathways may be stimulated or inhibited by simultaneous administration of another drug or exposure to an environmental chemical. The role of epoxides as active metabolites should be further investigated.

27190

APTIC NO. 48746

Dillard, C. J., N. Urribarri, K. Reddy, B. Fletcher, S. Taylor, B. de Lumen, S. Langberg, and A. L. Tappel

INCREASED LYSOSOMAL ENZYMES IN LUNGS OF OZONE-EXPOSED RATS. *Arch. Environ. Health*, 25(6):426-431, Dec. 1972. 29 refs.

Groups of rats were continuously exposed for 5 days to 0.7 + or 0.15 ppm ozone or for 7 days to 0.79 + or - 0.14 ppm ozone. The specific activities of the lysosomal hydrolases (acid phosphatase; beta-N-acetylglucosaminidase; cathepsins A, B, C, and D; and benzoylarginine-beta-naphthylamide (BANA) amidohydrolase) were measured in whole lung homogenates, cell-free particulates or light mitochondrial fractions, and in the supernatant fractions. Statistically significant increases in the specific activities of the hydrolases from ozone-exposed rats were observed over those from control animals. The increases can be attributed to the infiltration of the lung by phagocytic cells in the inflammatory response induced by ozone. The increase in specific activities of the proteases and peptidases in the lungs is significant when related to chronic obstructive pulmonary disease and cases of genetic deficiency of the alpha sub 1-antitrypsin factor. (Author abstract modified)

27191

APTIC NO. 48816

Dmitrijew, M. T., P. P. Jakimtschuk, and W. A. Kretowa

THE INCORPORATION OF TOXIC SUBSTANCES DURING INHALATION AND ITS METHODOLOGICAL IM-

EFFECTS-HUMAN HEALTH

27196

PL. FANCE. (Die Inkorporation toxischer Stoffe während des Atemprozesses und ihre methodische Bedeutung). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 18(12):894-896, 1972.

Theoretical considerations led to the recommendation to use the extent of retention of a pollutant for the rapid determination of limit concentrations such as the maximum allowable atmospheric pollutant concentration or working place concentration. The degree of retention of toxic substances during breathing can be determined by means of an equation using the pollutant concentration in the inhaled air, that in the exhaled air, and the background concentration of the pollutant as parameters. The relationship between the concentration of a toxic substance in the inhaled and exhaled air permits the assumption that the maximum allowable concentration of toxic substances in the inhaled air should equal the background concentration of the exhaled air. With this assumption, an equation for determination of the maximum allowable emission concentration is derived which shows that for compounds with a high degree of retention, the concentration in the exhaled air has no importance. Therefore, the maximum allowable emission concentration should be low. For compounds with low toxicity and low retention rate, the maximum allowable emission concentration should be half or equal to the concentration in the exhaled air.

27192

APTIC NO. 48652

Doi, M., T. Sekizawa, S. Nagaoka, H. Watanabe, and T. Suzuki

THE EFFECT OF PHOTOCHEMICAL SMOG ON THE HUMAN BODY. (Kokagaku sumogu no jintai eikyo ni kansuru chosa). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), no. 3:221-239, 1972. 13 refs.

In the summer of 1970, students of some secondary and high schools in Tokyo suffered from damage by photochemical smog. Results of questionnaires are discussed. When the subjects were divided into two groups, namely, the students who were at school at the time of the smog episode (A group) and the students who were out of school (B group), the morbidity rate was higher in the A group than the B group. The first symptom of photochemical smog was eye irritation, then throat irritation, and then shortness of breath. Headaches were observed in some subjects who were at school or near school at the time. Shortness of breath, convulsions, and numbness of limbs were observed only in the subjects who were on the school ground.

27193

APTIC NO. 48716

Flinn, James E. and Arthur A. Levin

ASSESSING THE HAZARDS OF CHEMICAL SPILLS AND TOXIC SUBSTANCES. Preprint, 7p., 1972. 5 refs. (Presented at the International Pollution Engineering Congress, Cleveland, Ohio, Dec. 4-6, 1972, Paper 6.)

Public concern is increasing over the inadvertent introduction of toxic and hazardous chemical substances into the environment because of transportation and handling accidents, contaminated or harmful consumer products, landfill and open dump leachates, and air, water, and solid waste emanations from manufacturing operations. Industry's problem is to alleviate this concern through a complete assessment of processing, distribution, and ultimate disposal of existing or new chemicals or chemical containing products, and through an assessment of toxicity. The general framework for performing such an assessment is given. Case study results are reported for mercury, lead, vanadium, nickel, fluorocarbons, pulp and paper chemicals, and pesticides. (Author abstract modified)

27194

APTIC NO. 48642

Giordano, Anthony M. and Paul E. Morrow

CHRONIC LOW-LEVEL NITROGEN DIOXIDE EXPOSURE AND MUCOCILIARY CLEARANCE. Arch. Environ. Health, 25(6):443-449, Dec. 1972. 28 refs.

Mucociliary clearance in the rat trachea was studied by a new technique permitting repeated measurements over a period of several months. Two transport parameters were used: a first edge time and a 20% transport time. When an animal was untreated, these parameters did not change significantly. A mean mucociliary velocity of 8.14 ± 0.41 mm/min was obtained from the first edge time measurements in 77 untreated rats. A 6-week exposure to 6 ppm nitrogen dioxide for 23.25 hr/day caused a significant increase in both parameters despite large individual variations. In animals demonstrating a depression in mucociliary transport, there was no apparent abnormality, and the functional impairment induced by NO₂ was reversible within 7 days. The NO₂ exposed animals showed signs consistent with NO₂ exposure interstitial edema and vascular congestion. Animals whose lungs were most congested also had the worst clearance. (Author abstract modified)

27195

APTIC NO. 48893

Haas, Th., K. Mache, K. -H. Schaller, W. Mache, and H. Valentin

INVESTIGATIONS INTO ECOLOGICAL LEAD LEVELS IN CHILDREN. (Untersuchungen ueber die oekologische Bleibelastung im Kindesalter). Text in German. Zentralbl. Bakteri., Parasitenk. Infektionskr. Hyg.: Abt. 1. Orig. Reihe B, 156(4-5): 353-360, 1972. 22 refs.

Lead levels in the blood of 363 children from 8 days to 8 years old were measured. Also, delta-aminolevulinic acid (ALA) in the urine of 269 test subjects and delta-aminolevulinic acid dehydratase (ALA-D) activity in the erythrocytes of 68 children were determined. Analytical correlation of the age in months and the lead level in the blood showed a statistically significant relationship. Starting with an average lead concentration of 3.3 ± 0.26 microgram % in the first year of life, a continuous rise in the lead level occurred until a value of 11.5 microgram % was reached at school age. At the same time there was a high dispersion of individual values at all ages. The average ALA-D activity of 68 infants and small children aged from 8 days to 3 years was 855 ± 306 micromol PBG/h/l erythrocytes. Statistically, this value does not differ from the average enzyme activity of normal adults. Analytical correlation did not reveal any dependence of ALA-D activity on the lead level in the blood. With the same 68 subjects, the average ALA excretion amounted to 2.1 ± 0.19 ml/l or 6.3 ± 0.35 mg/g creatinine. Statistics show that the volume of ALA excretion and the creatinine concentration in the urine rises with age. A dependence of ALA excretion due to creatinine on age could not be demonstrated, however. With 189 children aged from 6 to 8 years, the average ALA excretion was 4.6 ± 0.10 mg/l or 4.8 ± 0.14 mg/g creatinine. Neither among the 68 infants and small children, nor with the 6 to 8 year olds, was there any correlation of the ALA excretion with the lead level in the blood. The lead level in the children investigated can be regarded as low and smaller than that in normal adults. The values of biochemical parameters did not indicate any effect of the metal on intermediary metabolism.

27196

APTIC NO. 48598

Heppleston, A. G., K. Fletcher, and I. Wyatt

ABNORMALITIES OF LUNG LIPIDS FOLLOWING INHALATION OF QUARTZ. Experientia, 28(10):938-939, 1972. 10 refs.

After inhalation of quartz for extended periods and prolonged survival thereafter, specific pathogen-free (SPF) rats failed to acquire typical silicotic lesions, but instead responded by the development of pulmonary alveolar lipo-proteinosis. This condition was analyzed by histochemical, chemical, and immu-

nological means, establishing that, apart from the presence of quartz, the experimental disorder was similar to the human disease. The same samples of quartz were shown to be fibrogenic by intraperitoneal and intratracheal injection into other rats, both conventional and SPF. The outstanding feature of experimental lipo-proteinosis was the large lipid component of the alveolar material. Neutral lipids and phospholipids were identified histochemically. Particular groups of lipids were distinguished, quantitative and qualitative changes in lipid categories were investigated, and the percentage composition of the fatty acids from control and silica-exposed animals was determined. Biochemical and ultrastructural results are discussed.

27197

APTIC NO. 48744

Hoffmann, R.

STUDY OF THE SEPARATION OF AEROSOLS BY DIFFUSION IN THE HUMAN RESPIRATORY TRACT

(Ein Beitrag zur Diffusionsabscheidung von Aerosolen im menschlichen Atemtrakt) Text in German *Z. Ges. Hyg. Ihre Grenzgebiete* (Berlin), 18(12):890-894, 1972. 9 refs.

For a theoretical determination of the stationary aerosol deposition in a model respiratory tract, the complete diffusion equation was used. It was possible to treat the respiratory tract as a coherent, branching-out tube system. Thus, the particle transport into the alveolar section which is not directly ventilated could be determined without auxiliary assumptions. The model derived from morphometric studies by Weibel with regular dichotomy was slightly modified and used for the study. The extent of aerosol deposition and the flow density of the separated particles was calculated for the inhalation and exhalation phases. Spherical particles with a diameter of 0.002, 0.02, 0.08, 0.2, and 0.8 micron were used. The volume velocities of the inhaled air at the entrance of the model were 343.3 and 1243.3 cu cm/sec. During constant breathing conditions, the particles penetrated only into the first section (mouth) of the respiratory tract. In order to determine the influence of axial diffusion on the aerosol deposition, the diffusion equation was solved for both a coherent tube system of the respiratory tract and for isolated tube elements. The extent of deposition is illustrated for the particle diameters 0.002, 0.08, and 0.8 micron at a volume velocity of 343.3 cu cm/sec. With increasing volume speed the flow density increases. Through higher macroscopic transport, particles penetrate in larger numbers into the respiratory tract. Particles below a size of about 0.02 micron with extremely low flow density are also deposited in the alveoli.

27198

APTIC NO. 48830

Horn, K.

MEDICAL CONTROL OF THE ENVIRONMENT IN THE GERMAN DEMOCRATIC REPUBLIC (Medizinische Umweltkontrolle in der DDR) Text in German *Z. Ges. Hyg. Ihre Grenzgebiete* (Berlin), 18(12):874-879, 1972.

Hygiene inspectors in the German Democratic Republic have a twofold task concerning medical control of the environment: they have to determine the effects of pollutants on man and they have to provide data on environmental pollution. Standards, worked out in the Soviet Union for various air pollutants, were adopted in the German Democratic Republic. For each substance there are two standards: a short term (15 minutes) and a long term (24 hours) maximum allowable emission concentration. For sulfur dioxide the two values are 0.50 and 0.15 mg/cu m, respectively. Systematic measurements of emission concentrations are carried out in the German Democratic Republic over a period of 6 or 12 months by taking random samples. The measurement stations are set up in regular intervals of 1 or 2 km. (Air pollution discussed on P. 876-877.)

27199

APTIC NO. 48794

Kawaraya, T., T. Haruki, K. Tomita, and M. Oka

THE QUANTITY OF CANCER-CAUSING HYDROCARBONS IN THE AIR OF OSAKA CITY (6TH REPORT). --PRESUMPTION OF TOXIC INTENSITY BY BIOASSAY. (Osaka-shi no taikichu hatsugansei tankasuiso-ryo (Dai 6ppo) -- Bioassay ni yoru dokusei kyodo no suitei). Text in Japanese. *Nippon Koshu Eisei Zasshi* (Japan. J. of Public Health), 19(10):402, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

Hydrocarbons were measured in Osaka city and their effects on paramecium were studied as a bioassay. At a benzo(a)pyrene concentration of 0.001 to 0.0000001 g/ml, the effect of 1.12 benzperylene, 1.2 benzantracene, and chrysenes on paramecium were observed. The lethal ratio on each term had a zero within a nutrient observation interval of 120 min. The effect of ultraviolet emissions (relative intensity of 0.4) on paramecium was that the lethal ratio increased in about 40 min and became 100 in approximately 60 min. Each effect of benzo(a)pyrene plus ultraviolet radiation and of various hydrocarbons (0.00001 g/ml) plus ultraviolet radiation on paramecium is shown in a table. The intervals required for lethal ratios 100 and 90 at certain densities between 0.001 and 0.0000001 g/ml are shown. Intervals are also shown for lethal ratios 100 and 90 for each of 1.12 benzperylene, 1.2 benzantracene, and chrysene. A compound effect was obvious in the case of benzo(a)pyrene plus various hydrocarbons plus ultraviolet radiation reacting on paramecium; the lethal ratio was less in each application of a single pollutant than in application of more than one pollutant.

27200

APTIC NO. 48911

King, Graham

HOME MADE OZONE: A CASE FOR CONTROL. New Scientist, 56(816):146-147, Oct. 19, 1972. 3 refs.

Despite the health dangers of ozone, domestic air purifiers generate up to 0.10 ppm O₃. The threshold limiting value of O₃ tolerated in industry is 0.1 ppm and may be reduced to 0.04 ppm. At air purifier levels, there is a distinct risk of decreased resistance to natural disease and radiation damage to body tissue in addition to ozone induced eye, nose, and respiratory tract infection. Some control over the manufacture of domestic ozonizers is imperative.

27201

APTIC NO. 48802

Kosmider, St., K. Ludyga, A. Mistewicz, M. Drozd, and J. Sagan

EXPERIMENTAL AND CLINICAL EXAMINATIONS OF THE EMPHYSEMA-PROMOTING EFFECT OF THE OXIDES OF NITROGEN (Experimentelle und Klinische Untersuchungen ueber emphysembildende Wirkung der Stickstoffoxyde) Text in German *Zbl. Arbeitsmed.*, 22(12):362-368, 1972. 20 refs.

Through animal experiments and clinical observations, the influence of longer exposure to the nitrogen oxides on the respiratory tract was studied. Guinea pigs were exposed for 6 months to 1 ppm of NO_x; the results were compared with those of a control group. The body weight, the acid-base balance, the urine proteins, the diurnal values for hydroxyproline and acid mucopolysaccharide in the urine, and the lungs were examined. The clinical studies of 70 occupationally exposed (0.4 to 2.7 ppm) and 80 healthy individuals included anamnesis, physical, spirometric, gasometric, electrocardiographic, and hematological examinations, as well as chest X-rays. Also the blood proteins, hydroxyproline in urine, and acid mucopolysaccharide discharge in the urine were examined. An inhibition of the protein synthesis occurred with subsequent reduction of the total proteins and increase of immune serum globulin and inhibition of body weight. Through diminished resistance, the number of infections rose. In the

EFFECTS-HUMAN HEALTH

27208

lungs, the enzyme activity dropped, the bronchi were in spastic and inflamed, which reduced the gas exchange and disturbed the acid/base balance. Emphysema formed in the lungs due to damage of the lung collagen whose dissociation products were found in the urine.

27202

APTIC NO. 48965

Kubasik, Norman P. and Michael T. Volosin

CONCENTRATIONS OF LEAD IN CAPILLARY BLOOD OF NEWBORNS. *Clin. Chem.*, 18(11):1415-1416, Nov. 1972. 5 refs.

Lead concentrations in whole blood were determined for a random sampling of newborns (1-8 days old) with the use of a microtechnique analytical procedure. The mean lead concentration of the newborns (13.8 ± 0.4 or 4.5 micrograms/100 ml of whole blood) significantly differed from that of pediatric populations at low (22.6 ± 0.6) and high (32.1 ± 0.7) lead risk. The concentration of lead in the amniotic fluid was less than 20 ng/100 ml of fluid. (Author abstract modified)

27203

APTIC NO. 48565

Luederitz, P.

THE CONFIRMABLE EFFECTS OF CARBON MONOXIDE ON THE HUMAN ORGANISM. (Die nachweisbaren Wirkungen von Kohlenmonoxid auf den menschlichen Organismus). Text in German. *Z. Ges. Hyg. Ihre Grenzgebiete* (Berlin), 18(12):898-903, 1972. 58 refs.

The inhaled quantity of carbon monoxide depends on the emission concentration, on the duration of stay in the CO-polluted atmosphere, and on the air quantity inhaled during this stay. The hematologic, cardiovascular, neurological, ophthalmological, otological, and psychological effects of CO in connection with occupational and experimental exposures to CO are reviewed. Due to increasing traffic, CO concentrations of up to 100 mg/cu m must be expected. Such concentrations hardly cause pronounced physiological damages, but influences on the vegetative and psychic functions, however, can be assumed with certainty. A clear separation from the symptoms caused by stress is hardly possible since physiological and psychological examinations will determine all changes but not the causes. The only method for preventing effects to humans is the limitation of emissions.

27204

APTIC NO. 48705

Marks, Gayle E., Carl E. Moore, Eugene L. Kanabrocki, Yvo T. Oester, and Ervin Kaplan

DETERMINATION OF TRACE ELEMENTS IN HUMAN TISSUE. I. CD, FE, ZN, MG, AND CA. *Appl. Spectry*, 26(5):523-527, Sept./Oct. 1972. 14 refs.

Human tissues obtained at autopsy were analyzed for cadmium, iron, magnesium, zinc, and calcium content using atomic absorption spectrophotometry to establish the body level of these metals in thoracic aortas, lungs, myocardium, and spleen. The category of diseases included atherosclerotic heart disease, malignancy, liver cirrhosis, endocrine diseases, brain tumors, emphysema, and uremia. The levels of the elements are tabulated. (Author abstract modified)

27205

APTIC NO. 48563

Matz, J.

THE IMPORTANCE OF NITROSAMINES FOR COMMUNAL HYGIENE. (Zur kommunalhygienischen Bedeutung der Nitrosamine). Text in German. *Z. Ges. Hyg. Ihre Grenzgebiete* (Berlin), 18(12):903-908, 1972. 119 refs.

Nitrosamines are formed when nitric acid, nitrites, or nitroso gases meet with secondary amines both in solution and in the gaseous phase. Although nitrosamines are present in the human environment in general in very small concentrations, only its presence in food and in various technical products (antiknocking agents and lubricants) has received attention. There

is strong indication that nitrosamines are also present in the atmospheric air and their identification in cigarette smoke confirmed it. With the exception of one paper, no studies of the nitrosamines in atmospheric air have been conducted, although nitrosamines are very likely present in industrial centers highly polluted with nitrogen dioxide and certain amines. The methods for analyzing N-NO-compounds in various substances and the effects on laboratory animals are reviewed. Nitrosamines are carcinogens and affect the liver. Upon inhalation of methylbutyl nitrosamine rats developed throat cancer after doses between 70 and 200 mg/kg applied over a period of 23 weeks.

27206

APTIC NO. 48660

Milanesi, Albert A., Louis J. Ramazzotto, Peter Maio, and C. Robert Jones

NITROGEN DIOXIDE EFFECT ON CATHEPSIN ACTIVITY OF PULMONARY LYSOSOMES. *Arch. Environ. Health*, 25(4):301-304, Oct. 1972. 12 refs.

Infusion of different concentrations of nitrogen dioxide on rat lung homogenates did not significantly change the binding state or specific free activity of cathepsin D, an acid hydrolase, found in lysosomes. The in vitro studies indicated a contradiction to previously reported data on the labilizing ability of NO₂ on subcellular organelles and their constituent enzymes, as studied in far more complex in vivo systems. (Author abstract modified)

27207

APTIC NO. 48541

Nagaoka, Shigeru

THE EFFECT OF CO IN THE AIR ON THE HUMAN BODY. (Taikichu no issankatanso no jintai eikyo ni kansuru chosa hokoku). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), no. 3:211-215, 1972.

Bus drivers and conductors and conductors who did not smoke were studied for the effects of carbon monoxide. The CO content in the air surrounding the subjects was about 5 - 10 ppm. The CO content in breath expiration was in proportion to the volume of smoking; the average CO content in the expiration of the drivers who did not smoke showed a higher value (65 ppm) than that of workers in other fields (5 - 10 ppm). The CO content in the expiration after working was higher than that before working. The length of service, height, and weight did not have an effect on the CO content in the expired air. There was a mutual relationship between the CO content in expiration and subjective symptoms.

27208

APTIC NO. 48532

Palmer, Michael S., Ray W. Exley, and David L. Coffin

INFLUENCE OF POLLUTANT GASES ON BENZOPYRENE HYDROXYLASE ACTIVITY. *Arch. Environ. Health*, 25(6):439-442, Dec. 1972. 20 refs.

Exposure to concentrations of ozone as low as 1.4 mg/cu m (0.75 ppm) depresses the activity of benzpyrene hydroxylase in lung parenchyma. Because most pulmonary cancers occur in the tracheobronchial area rather than in the lung itself, the effect of two atmospheric pollutants, ozone and nitrogen dioxide, on benzpyrene hydroxylase activity in the tracheobronchial mucosa of rabbits was studied. Rabbits were exposed to O₃, NO₂, or filtered air for 3 hours and killed; their mucosa was scraped off, weighed, and assayed. Inhibition of enzyme activity was caused by several concentrations of O₃; no demonstrable early or delayed effect of NO₂ inhalation occurred. These findings were consistent with previous reports which suggested a cocarcinogenic role for O₃. The role of NO₂ in carcinogenesis is uncertain, but it is apparent that NO₂ is chemically less active than O₃. (Author abstract modified)

27209

APTIC NO. 48824

Reiter, Reinhold, Karl Poetzel, and Walter Carnuth

AN AUTOMATIC RETENTION SIMULATOR. (Ein automatischer Retentionssimulator). Text in German. Staub, Reinhaltung Luft, 32(10):392-399, Oct. 1972. 13 refs.

An automatic aerosol retention simulator for determining particle retention in the respiratory tract is described. The particles of the unknown aerosol are labeled with TbB in a diffusion chamber. The aerosol is drawn off via a quadruple step-by-step filter cascade. After the end of each exposure the trace radioactivity on the four exposed filter sections is measured and printed out; it constitutes an indicator of the aerosol surface. The four measured values indicate deposited aerosol surface in tracheal, bronchial, and alveolar tracts, and expiration rate. Presentation of the aerosol surface distribution is meaningful since biological primary processes are dependent on particle surface. If a primarily radioactive aerosol is involved, labeling is not applicable. Relative radiation exposure of the respective sections of the respiratory tract may then be rated directly. The results of measurements with the automatic retention simulator in the vicinity of an iron plant with a converter, a caolin/quartz plant, and a foundry are listed in tables. At 400 m from the iron plant the retention in the trachea and the main bronchi increased, while the expiration rate dropped. Directly outside the caolin/quartz plant the retention in the trachea was high but did not reach the values at 400 m from the converter. A minimum of tracheal retention occurred 500 m from the caolin plant. In the vicinity of the foundry between 12.3 and 13.7% silicon/dioxide (in coarse dust) was retained in the trachea; 16.4 to 16.9% in the bronchi; 27.7 to 32.1% in the alveoli and terminal bronchi. The expiration rate was 38.8 to 42.2%. The reproducibility of the measurements at constant aerosol composition was remarkably good. The distance, weather conditions, and production conditions had an influence on the results.

27210

APTIC NO. 48857

Saito, K., H. Takakuwa, T. Sato, and Y. Sato

THE INFLUENCE OF ATMOSPHERIC LEAD IN THE CITIES OF HOKKAIDO. (Hokkaido no toshi ni okeru takaku namari no eikyo). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan J. of Public Health), 19(10):413, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

The effect of atmospheric lead on 203 traffic officers in cities in Hokkaido, Japan was studied. Blood gravity, hematocrit values, delta-aminolevulinic acid dehydratase activity, and lead in the blood were measured. The total blood gravities and lead concentrations in the blood were greater in officers working in large cities than in officers working in small and medium cities. The difference in the values of capillary tube hematocrit was virtually insignificant. The distribution of lead concentrations in the blood compared to years of duty is described. Lead concentrations in the air of Sapporo and Otaru cities was 0.18 to 8.96 micrograms/cu m, values of 5 micrograms/cu m were recorded in Sapporo in 13 of 275 measurements.

27211

APTIC NO. 48782

Sander, J. and F. Schweinsberg

INTERRELATIONSHIPS BETWEEN NITRATE, NITRITE AND CARCINOGENIC N-NITROSO-COMPOUNDS. I. COMMUNICATION. NITRATE, NITRITE AND NITROSABLE AMINO-COMPOUNDS IN FOOD AND DRUGS. CHEMISTRY OF N-NITROSO-COMPOUNDS. (Wechselbeziehungen zwischen Nitrat, Nitrit und kanzerogenen N-Nitrosoverbindungen. I. Mitteilung. Nitrat, Nitrit und nitrosierbare Aminoverbindungen der Nahrungs-, Genuss- und Arzneimittel. Chemie der N-Nitrosoverbindungen). Text in German. Zentralbl. Bakteriell. Parasitenk. Infektionskr. Hyg. Abt. I. Orig., Reihe B, 156(4-5):299-320, 1972.

The occurrence and formation of nitrate, nitrite, and nitrosable amino-compounds are discussed. The widespread occurrence of these precursors of carcinogenic nitroso compounds made it necessary to conduct experiments to determine what conditions influence the formation of N-nitroso compounds. In the group of secondary amines, only those with a moderate or low basicity are nitrosated easily enough to induce cancer when incorporated simultaneously with nitrite. Simple aliphatic tertiary amines which may be nitrosated at the pH prevailing in the stomach did not induce tumors when given together with nitrate. Feeding of methylurea, ethylurea, 1,3-dimethylurea, and ethyleneurea resulted in the induction of cancer in rats, provided the animals received nitrite in the drinking water simultaneously. The formation of N-nitroso compounds inside the macroorganism has the same effect as the ingestion of these carcinogens themselves. If, however, such compounds are formed in the environment or the food, it will depend upon the stability of the compounds, whether they are likely to be ingested or not. Many nitrosamines are so stable that they can accumulate quite well in the environment and hence are likely to be ingested, although they are not easily formed. Because of the use of nitrogen-containing fertilizers, edible plants and drinking water show an increase in nitrate content. Experiments with edible plants showed that an accumulation of nitrosamines in the plants due to heavy application of nitrogen-containing fertilizers does not take place. No induction of tumors in man by N-nitroso compounds is known from the literature, even though a number of N-nitroso compounds have been used in laboratories and industry. Some epidemiological studies showed a correlation between certain N-nitroso compounds or their precursors and the occurrence of certain tumors. Nitrate and other precursors of carcinogenic N-nitroso compounds should be limited in the environment, drugs, and foodstuffs.

27212

APTIC NO. 48995

Shishido, M., T. Sugita, F. Higuchi, N. Sukegawa, and K. Saruta

HEALTH DISORDERS OF INFANTS AND AIR POLLUTION. (Shoni no kenko shogai to taiki osen tonu kankou). Text in Japanese. Kanagawa ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 14:93-108, Feb. 1972. 1 ref.

The results of a questionnaire on kindergarten pupils in Yokohama City in 1971 are presented. Correlations between the content of sulfur dioxide in the air and the subjective symptoms were found for colds in areas where the sulfur trioxide content in air was over 0.3 mg SO₃/day/100 sq cm lead dioxide, for sore throat (the higher the SO₃ content was, the higher the rate of complaint), for eye irritation only in an area where the SO₃ content was over 1.5 mg SO₃/day/100 sq cm PbO₂, and for asthma. No correlation was observed for fever except for an area where the SO₃ content was over 1.5 mg SO₃/day/100 sq cm PbO₂. In comparison with the results of 1968, the rate of complaint of these symptoms was higher in 1971.

27213

APTIC NO. 48797

Sidorenko, G. I. and M. A. Pinigin

DETERMINATION OF THE LONG TERM MAXIMUM ALLOWABLE EMISSION CONCENTRATION ON THE BASIS OF RAPID TESTS. (Ueber die Voraussage des MK Lanzen-Wertes atmosphärischer Verunreinigungen auf der Grundlage von Schnelltests). Text in German. Z. Ges. Hyg. ihre Grenzgebiete (Berlin), 17(12):880-882, 1972.

The concentration/time dependence of the occurrence of certain symptoms in rats and mice after uninterrupted inhalation of gasoline fumes, benzene, styrol, acetone, methanol, and dimethyl aniline is shown in graphs. The toxic effects occur in shorter periods of time upon inhalation of high concentration than of low concentrations. Thus the dependence concentration/time, and not as commonly the dependence dose/effect, was used as parameter for the acute toxicity. The rapid

method for determining the long-term maximum allowable emission concentration therefore is based on an inhalation experiment lasting 3-4 weeks in which the dependence concentration/time is determined for a certain pollutant. The results are then linearly extrapolated to the average life expectancy of the test animal which yields the concentration that should be recommended as a long-term maximum allowable emission concentration.

27214

APTIC NO. 48566

Stupfel, M. and K. Basmadshijewa

THE NEUROPHYSIOLOGICAL EFFECT OF THE INHALATION OF 50 PPM CARBON MONOXIDE. (*Der neurophysiologische Effekt der Einwirkung von 50 ppm Kohlenmonoxid auf weisse Ratten*). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 18(12):896-898, 1972. 25 refs.

Because of continuously rising amounts of traffic, 20 to 50 ppm concentrations of carbon monoxide measured in some large cities such as New York, London, Tokyo, and Paris. Higher concentrations were measured in street tunnels, 91 ppm in a street tunnel in Paris, 250 to 300 ppm in Japan and the U. S., and 500 ppm in England. The effect of the inhalation of 50 ppm of CO on the central nervous system was studied with white rats of different ages. The exposure chambers were set up in an air conditioned room at 19-21 C and 60-70% humidity. The animals were exposed to 50 ppm CO for 5 consecutive days. The neurophysiological effect of CO on the laboratory animals was determined by the changes in conditioned reflexes. The method by Marfaing-Jallet and Le Maquer was used. The changes in the conditioned reflexes observed at the beginning of the experiments led to an acceleration of the cardiac rhythm and to electrocardiographic changes.

27215

APTIC NO. 48789

Symon, K.

THE QUESTION OF SCIENTIFIC EXPLANATION, PRECISIONING, AND UNIFYING OF MAXIMUM ALLOWABLE EMISSION CONCENTRATIONS OF POLLUTANTS IN ATMOSPHERIC AIR. (*Zur Frage der wissenschaftlichen Begründung, Präzisierung und Vereinheitlichung der MİK-Werte schädlicher Stoffe in der atmosphärischen Luft*). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 18(12):884-887, 1972.

With the aim of bringing maximum allowable emission standards to a more uniform level the quality indicators of atmospheric air are divided into four categories. Category one includes concentrations and exposure times which do not cause direct or indirect effects (including reflectory adaptation and resistance reactions). Category two includes concentrations and exposure times which, when exceeded, have a damaging effect on the sense organs, on plants, or which reduce visibility. Category three includes concentrations and exposure times which, when exceeded, change or destroy physiological functions and cause chronic diseases or shorten the life. Category four includes concentrations or exposure times which, when exceeded, cause disease or death of sensitive persons. There is a tendency to determine not only the maximum allowable emission concentration for a certain pollutant, but also a maximum allowable diurnal concentration.

27216

APTIC NO. 48636

Takizawa, Y., I. Ogima, Y. Watanabe, S. Kuroda, and T. Oshina

THE EFFECT OF AIR POLLUTION DUE TO FLUORIDE ON THE HUMAN BODY - THE THIRD REPORT. (*Alumi kojo shuhen ni okeru fuukabutsu ni yoru taiki osen no jintai ni oyobosu eikyo ni tsuite - dai sanpo*). Text in Japanese. Kankyo Hoken Reporto (Environ. Health Rept.), no. 16:59-71, Dec. 1972.

A group of 1210 infants, children, and 1147 students aged between 3 and 15 living within 1 km of a factory which produced fluorides (A group) and 63 subjects for comparison (B group) were studied. The first examination studied subjective symptoms and teeth. The fluorine content in urine was 0.181 ppm in A group and 0.391 or 0.408 ppm in B group; this value was higher in boys than in girls. The most frequent subjective symptoms which the subjects complained of were respiratory symptoms especially cough and phlegm. Dysodontiasis or insufficiency of calcification were observed 20.2% of A group. The second examination was done on the subjects who had fluorine in the urine over a 0.42 ppm concentration and who showed other symptoms and on the subjects whose fluorine content was under 0.42 ppm but who showed the symptom of dysodontiasis. The average fluorine content in the urine was 0.358 and 0.204 ppm, respectively; these values were less than the content of the first examination because this examination was done before a meal.

27217

APTIC NO. 48637

Takizawa, Y., I. Ogima, Y. Watanabe, S. Kuroda, and T. Oshina

THE EFFECT OF AIR POLLUTION DUE TO FLUORIDE ON THE HUMAN BODY - THE FOURTH REPORT. (*Alumi kojo shuhen ni okeru fuukabutsu ni yoru taiki osen no jintai ni oyobosu eikyo ni tsuite - dai yonpo*). Text in Japanese. Kankyo Hoken Reporto (Environ. Health Rept.), no. 17:69-89, Dec. 1972.

A third examination was made of 74 children and infants who showed symptoms of pulmonary fibrosis, who were diagnosed as bronchitis or asthma patients, or who showed dysodontiasis. The fluorine content in the urine of boys (38 cases) was 0.500 ppm and that of 34 girls was 0.484 ppm. The highest value was 1.5 ppm of a girl, and four cases were over 1.0 ppm. As a result of a dental examination, a mild insufficiency of calcification was observed 10 cases and moderate one in six cases. The respiratory diseases were not observed. As a result of a heart examination, myocardosis was found in two cases and enlargement of cardiac ventricle in one case.

27218

APTIC NO. 48475

Wada, Osamu, Otohiko Takayama, Shozo Miyamoto, Yoshizo Tsunetoshi, and Shigeru Nagaoka

AIR POLLUTION AND RESPIRATORY DISEASES.

(*Taiki osen to kokyuki shikkan*). Text in Japanese. Medicina (Medicine) (Japan), 9(12):2114-2122, Nov. 1972.

The history of air pollution and respiratory diseases, the transition of epidemiological study methods and objects, air pollutants and asthmatic attacks, the otorhinolaryngological point of view on air pollution, allergies, the effects of dusts, and future studies are discussed informally and at random in this record of a panel discussion. The difficulty of tracing the complex pollutant effects is stated. The need for simultaneous measurement and analysis of complex elements, rather than single elements such as sulfur dioxide or nitrogen oxides, and the examination of correlations are advocated. The validity of chronic bronchitis as an index of air pollution is seriously questioned. The susceptibility of the host body to the multiplicity of certain elements is an important factor in certain diseases such as asthma. However, what sort of host factor react to what air pollutant is not clearly known. The hereditary asthmatic atopic syndrome the alpha-antitrypsin concentration in blood and certain lymphocyte types which seem to cause susceptibility to air pollution are discussed.

EFFECTS-PLANTS AND LIVESTOCK

1973

27219

APTIC NO. 48639

Yamazoe, Fumio

THE EFFECT OF AIR POLLUTION ON AGRICULTURE AND FORESTRY. (*Taiki osen ni yoru norin kogai*). Text in Japanese. *Nogyo Oyobi Engei (Agr. Hort.)*, 48(1):133-138, 1973. 6 refs.

The effect of hydrogen fluoride on plants is stronger than on animals. The threshold value of indicator plants (*gladioli*) is 5-10 ppb/day. The HF can cause etiolation at the tip or fringe of leaves. Silkworms fed leaves polluted by over 30 ppm of HF became ill. Cows exhibit fluorosis effects in teeth and bones after HF exposure. Chlorine turns leaves yellow by causing decomposition of chlorophyll. Plant damage occurs after 2-4 hr of exposure to 0.05-0.07 ppm of ozone or after 8 hr of exposure to 0.05 ppm of peroxyacetyl nitrate. Ozone causes white or brown spots on the surface of leaves; peroxyacetyl nitrate causes silver or bronze spots.

1972

27220

APTIC NO. 48585

SAVING THE GREEN. *Agri. Res.*, 21(4):3-5, Oct. 1972.

Sixty-five varieties of petunias were rated for tolerance and sensitivity to ozone in fumigation chamber experiments. The most tolerant plants were Capri, Fire Gleam, Pink Joy, Popeye, and Purple Plum; the most sensitive were Fiesta, Harmony, Pink Paradise, Snow Magic, and White Joy. The 55 remaining plants fell into four intermediate categories. The ability of different growth-retarding chemicals to protect petunia plants against ozone damage was also evaluated. Succinic acid 2,2-dimethyl hydrazide (SADH) was outstanding in protecting the plants. Although twice as much SADH was required for best plant protection than is required to produce compact plants in nurseries, plants sprayed for greatest ozone protection were no shorter than those sprayed for compact growth.

27221

APTIC NO. 48941

Kanagawa Prefecture Agriculture Experiment Station (Japan)

THE EFFECT OF AIR POLLUTION ON PLANTS-THE FLUORINE CONTENT IN STREET TREES. (*Jumoku ni taisuru taiki osen no eikyo-Gairoju-yo no fusso ganryo*). Text in Japanese. *Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area)*, no. 14:87-92, Feb. 1972.

Leaves of street trees in Kawasaki and Yokohama cities were collected in 1967. The maximum value of the content of fluorine in the leaves was 1653 ppm; the minimum value was 22 ppm and the average value was 135 ppm. There was a regional difference in the fluorine content in leaves between an industrial area and a commercial or residential area. The fluorine content in leaves of an industrial area and a commercial or residential area was in the ratio 10 and 2 or 3. There was a mutual relationship between the value of sedimented dust in the air and the content of sulfur oxides in air and the content of fluorine in leaves. The relationship between the fluorine content and the sulfur content in leaves and the relationship between the fluorine content in leaves and insoluble substances stuck to the leaves was not clear. The fluorine content in the soil was between 108 and 504 ppm, and the average content was 240 ppm.

AIR POLLUTION ABSTRACTS, MAY 1973

27222

APTIC NO. 48996

Kanagawa Prefecture Agriculture Experiment Station (Japan)

THE EFFECT OF AIR POLLUTION ON PLANTS - HEAVY METAL CONTAINED IN STREET TREES. (*Jumoku ni taisuru taiki osen no eikyo - Gairoju-yo no junkinzoku*). Text in Japanese. *Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area)*, no. 14:75-86, Feb. 1972.

Leaves of street trees in Kawasaki and Yokohama cities were collected in 1967. Heavy metals were measured including iron, manganese, zinc, copper, nickel, lead, chromium, and cadmium. The average concentrations of metals in leaves were 862 ppm (iron), 69 ppm (manganese), 90 ppm (zinc), 24 ppm (copper), 9 ppm (nickel), 23 ppm (lead), 7 ppm (chromium), and 0.9 ppm (cadmium). The heavy metals except for cadmium were contained more in trees in industrial area than in trees in commercial or residential area. There was a mutual relationship between insoluble substances stuck to leaves and the content of heavy metals in the leaves. A change of the content of heavy metals in leaves according to the month occurred; the new leaves of May did not contain as much as previous months, but after July or August the value showed an increase.

27223

APTIC NO. 48798

Boertitz Siegfried and Horst Ranft

ON THE SUSCEPTIBILITY OF LICHENS AND MOSSES TO SO₂ AND HF. (*Die SO₂ und HF-Empfindlichkeit von Flechten und Moosen*). Text in German. *Biol. Zentralbl.*, 91(5):613-623, 1972. 16 refs.

The assimilation of 20-25 different types of mosses and lichens exposed to sulfur dioxide and hydrogen fluoride containing air was studied. For the assimilation measurements with the carbon dioxide URAS, the samples were put into glass cuvettes. For a study of the externally visible injuries, the sample material was exposed for 36 hours to 3.5-5.5 mg SO₂/cu m air and for a period of 27 hours to 0.3-0.4 mg HF/cu m. During the four to five days of exposure the weather was cloudy with showers. The noon temperatures were between 6 and 10 C. A sunny afternoon at the end of the experiments accelerated the development of visible damages. The exposure to phytotoxic substances such as SO₂ and HF does not immediately produce visible injuries. These substances gradually are retained in the plant tissue; moreover they are capable of reversibly or irreversibly influencing the photosynthesis. The assimilation intensity diminished during fumigation and gradually picked up again afterwards, provided the assimilation apparatus was not irreversibly damaged. With several lichens and mosses the visible injuries did not correspond in any way to the damages of the assimilation organism. The physiological dynamics prior to the occurrence of visible damage showed no fundamental difference in lichens from higher plants affected by phytotoxic substances.

27224

APTIC NO. 48976

Fujiwara, Takashi and Haruhiko Ishikawa

THE EFFECTS OF NITROGEN OXIDES ON VARIOUS PLANTS. (*Chisso sankabutsu no ni, san shokubutsu ni oyobosu eikyo*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 234. (Nov. 7-9, Paper 188.)

The effects of nitric oxide and nitrogen dioxide on plants and vegetables were observed by the use of vinyl exposure chambers. The concentration in the chamber was constantly checked by a detector and the Saltzman method, or by an automatic electrochemical meter. Rice, soy bean, sweet potato, sesame, tomato, eggplant, cucumber, strawberry and grape plants were exposed to 4-10 ppm NO₂ for 4-8 hr. Soybean and buckwheat plants showed a waxy appearance on the leaves when the exposure was completed, and then gradually chlorosis appeared. Grape leaves showed a black mottling the day

after the exposure. When the gas concentration was increased to 20 ppm, these symptoms appeared on most of the plants. Eleven kinds of vegetables and plants were exposed to 0.3-0.6 ppm NO₂ for 13-55 days. Tomatoes, eggplants, and buckwheat leaves dropped, and the growth was impaired on buckwheat, eggplants, and radishes.

27225

APTIC NO. 48689

Fukuoka, Yoshitaka

AIR POLLUTION AND PLANT DAMAGES ALONG THE AZUMA SKYLINE. (*Azuma sukai rain ni okeru taiki o sen to shokubutsu higai*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 233. (Nov. 7-9, Paper 187.)

The effects of air pollution on the plants alongside the Azuma Skyline Drive in Fukushima Prefecture were investigated between Aug. and Oct. 1971. Carbon monoxide, nitrogen dioxide, sulfur dioxide, humidity, temperature, wind direction and speed, plant conditions, and the traffic conditions were investigated. The pollution and plant damage trends were classified according to the topography. In the middle of the slopes, a high concentration of CO (8-20 ppm) was generally found, and plant damage was heavy on the valley side. At the bottom of valleys, pollution was normal (CO, 7 ppm), and the tree damage was heavy in the lee. On the top of hills, the concentration depended on the weather conditions, especially on fog and wind velocity; much damage was noted on both sides of the road. Where the road was lined by trees on both sides, the pollution tended to be slightly high (7-12 ppm of CO), and the plant damage was prevalent in the lee. On curved roads, pollution was not high; both in the lee and on the valley side, some dead trees were noted. Parking areas were generally well ventilated and the concentration was rather low (CO 0-4 ppm) for the number of cars.

27226

APTIC NO. 48786

Gundermann, K. O.

INFLUENCE OF ATMOSPHERIC HUMIDITY ON THE SURVIVAL OF BACTERIA IN DUST. (*Untersuchungen zur Lebensdauer von Bakterienstämmen in Staub unter dem Einfluss unterschiedlicher Luftfeuchtigkeit*). Text in German. Zentralbl. Bakteriologie, Parasitenk. Infektionskr. Hyg.: Abt. 1: Orig., Reihe B, 156(4-5):422-429, 1972. 36 refs.

The survival of hospital strains of bacteria in dust with the influence of varying degrees of humidity was studied on six samples each of four types of bacteria. In each case, 0.5 g of ordinary house dust was mixed with 0.1 ml of a 24-hour broth culture of the bacterial strain, dried, and then kept at a relative humidity of 0%, 32%, 42%, 58%, and 99%. Samples were taken with a sterile probe at weekly intervals at first, and then at fortnightly intervals, and then were cultured in an appropriate medium. The last positive sample was evaluated. The greatest resistance at all humidities was exhibited by the klebsiella strain; some strains survived for more than 2.5 years at 0%, 32%, 58%, and 99%. *Ps. aeruginosa* and *E. coli* also survived for a long time (1 year and over 2.5 years, respectively) at a relatively low humidity and at a high humidity. The life of the staphylococci was only about 1/2 year at low humidity and shorter still at high humidity. The survival periods varied more from strain to strain of one kind of bacteria than from one kind of bacterium to another. Thus, irrespective of the relative humidity, contaminated places must be regarded as remaining so for months or years. At high humidity, the danger of contamination is greatest with *Ps. aeruginosa*.

27227

APTIC NO. 48872

Hoshino, Tsuneo

CORRELATION BETWEEN THE YIELD OF CROPS AND AIR POLLUTION. (*Nosakubutsu no shuryo to taiki o sen*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 236. (Nov. 7-9, Paper 190.)

The monthly correlation between the quantity of harvest and the degree of pollution was examined. The complicating factors such as climate, agricultural technique, and management were taken into consideration, and two areas with similar climate and agricultural activities were selected for comparison. Ube and Bofu in Yamaguchi Prefecture were selected as examples of polluted and non-polluted agricultural cities. The crop records between 1960 and 1968, using the yields of Bofu as the standard indexes of rice, wheat, barley, potatoes, and sweet potatoes yields in Ube were examined. In general, only localized high pollution occurred in Ube, and within the 202 sq km of the city limit, there was no high concentration to cause true plant damage. On the contrary, plus correlations were found in rice, wheat, barley, and potatoes; a minus correlation was found only in sweet potatoes. These characteristics agreed with the patterns of the resistance of these crops to SO₂.

27228

APTIC NO. 48873

Hoshino, Tsuneo

AN ESTIMATION OF DAMAGE BY SO₂ ON CROPS.

(*SO₂ nodo bunpu kara mita nosakubutsu no damage no suitei*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 235. (Nov. 7-9, Paper 189.)

Ube and Onoda, industrial and agricultural areas of Yamaguchi Prefecture, have a special pattern of sulfur dioxide concentration. All the high concentration of SO₂ in these two cities appear within the radius of 4 km from the emission sources, and there is almost no damaging effect of SO₂ on agricultural crops. The geographical distributions of SO₂ concentration of 0.1 ppm, which is the threshold for crop damages, and 0.018 ppm, which is the threshold for bryophytes mortality, were examined. The total area with the concentration of 0.018 ppm fluctuated monthly from 3 sq km to 27 sq km, with a mean area of about 20 sq km. The total area with more than 0.1 ppm concentration was relatively small, and mostly in commercial areas of Onoda and Ube, which do not affect agricultural crops anyway. Between March and May, and November and December, there was no area with more than 0.1 ppm of SO₂. In February, 8 sq km in Onoda and 4 sq km in Ube had more than 0.1 ppm; from June through October, some 2 sq km in Onoda and 1 sq km in Ube were affected by more than 0.1 ppm SO₂. Produce were almost free of any damage from SO₂ in these areas.

27229

APTIC NO. 48640

Jiracek, V., I. Machackova, and J. Kostir

DETECTION OF BISULFITE ADDUCTS (ALPHA-OXY-SULFONIC ACIDS) OF CARBONYL COMPOUNDS IN SO₂-TREATED YOUNG PEA PLANTS. (*Nachweis der Bisulfit-Addukte (alpha-Oxysulfonsäuren) von Carbonylverbindungen in den mit SO₂ behandelten Erbsenkeimlingen*). Text in German. *Experientia*, 28(9):1007-1009, Sept. 15, 1972. 18 refs.

The intoxication of 15-day-old green pea seedlings with 1% gaseous SO₂ caused an important fall of some free ketoacids (pyruvic, oxalacetic, alpha-ketoglutaric) and of glyceraldehyde in the roots and shoots. This fall was a consequence of the reaction of these carbonyl compounds with SO₂ in the plant tissue under the formation of bisulfite adducts (alpha hydroxy-sulfonic acids), which were chemically proved and quantitatively estimated.

27230

APTIC NO. 48861

FACTORS AFFECTING PLANT UPTAKE AND PHYTOXICITY OF CADMIUM ADDED TO SOILS. *Environ. Sci. Technol.*, 6(12):1005-1009, Nov. 1972. 22 refs.

Smelting and electroplating of metals, motor oils, motor vehicle tires, and fungicide sprays are sources of cadmium in the environment. The factors affecting plant uptake and phytotox-

icity of cadmium added to soils were investigated. For a set of 30 surface soils, the addition of 50 mg Cd (from CdCl₂) to 500 g of soil reduced yield and sharply increased Cd levels in analyzed portions of radish and lettuce plants when compared to those plants grown on control soil. For the treated soil, plant Cd was significantly related to Cd in the soil. From among 18 potential independent variables, stepwise linear regressions to predict Cd found in plant parts harvested for treated soils included a measure of the relative ability of soils to absorb Cd, acetate-soluble Cd in the soil, soil reaction, and organic matter as significantly contributing independent variables. Plant Cd levels were significantly correlated with amounts of nickel, iron, zinc, and copper in the same plant portion. (Author abstract modified)

27231

APTIC NO. 48556

Kaneda, K., R. Sugai, Y. Fujieda, and E. Abe

ATMOSPHERIC POLLUTION BY FLUORIDE AND ITS INFLUENCE ON PLANTS. (Fukkabutsu ni yoru taikiosen to shokubutsu eikyo). Text in Japanese. Nippon Kosho Eisei Zasshi (Japan. J. Public Health), 19(10):423, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

Atmospheric fluoride concentrations were measured from May 1969 to March 1972 for each month by the limus and alkali filter paper methods. The growth of potted gladioli at 11 spots near two factories (phosphate fertilizer and an aluminum refining factory) was measured in 1969, of rice at 30 spots in 1970, and of cedar trees at 38 spots in 1971. Gladioli growth was measured at 10 spots; at two spots with high fluoride concentration, the leaf color change, retardation of height and number of leaves, and other significant differences were observed. At 1 km from the factory, the plant growth rate decreased. Cedar trees, checked at 37 spots except for nine contrasted spots, revealed some damage. Some correlation was found between atmospheric fluoride concentration and more fluorine quantity in the leaves.

27232

APTIC NO. 48729

Miyoshi, Takekatsu, Yoshi Jinzo, Yasunori Kanashima, Junichi Machida, and Fumie Shimomura

THE SOURCES OF HEAVY METALS IN MULBERRY LEAVES IN ANNAKA -- ANALYSIS OF THE SOURCES FROM SOIL AND AIR. (Annaka chiku soyochu no jukinzoku no yurai keiro-dojo kara to taiki kara to no kaiseki). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 226. (Nov. 7-9, Paper 180.)

The mulberry leaves grown south of Annaka city and the Toho Zinc Refinery contain levels of cadmium and zinc that may be dangerous to silkworms. Experiments were conducted 0 to see the exact source of these toxic heavy metals. Flower pots were installed at various polluted and unpolluted locations, and the unpolluted soil of the sericultural Experiment Station and the soil of the polluted location in Annaka were compared for growing mulberry seedlings. The plants that were grown in the soil of the unpolluted area showed a different metal content in the leaves depending on the atmospheric content of metals, showing that the air pollution definitely played an important role in the pollution of mulberry leaves. Those grown at the Experiment station had 0.10 ppm of Cd and 23 ppm of Zn; using the same soil, those grown in the polluted area of Annaka had 1.70 ppm of Cd and 343 ppm of Zn. However, using the soil of the polluted area and grown in the polluted atmosphere, the maximum content of Cd was 3.58 and of Zn was 1050 ppm in the mulberry leaves.

27233

APTIC NO. 48726

Nakagawa, Yoshihiro, Hidekatsu Mitsugi, and Kokei Takata

ACCUMULATION OF HEAVY METALS IN WHEAT EXPOSED TO THE EMISSION PARTICULATES OF A

AIR POLLUTION ABSTRACTS, MAY 1973

ZINC REFINERY. (Komugi saibai shiken kara mita shushi e no jukinzoku no chikuseki ni tsuite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 225. (Nov. 7-9, Paper 179.)

Experiments were conducted on the cumulative effects of heavy metals (cadmium, lead, and zinc) absorption on wheat through the surface of leaves. Wheat seedlings were planted in 1/5000 Wagener pots and wooden boxes. The dusts emitted from the sintering process of a zinc refinery were identified by an X-ray diffraction device, and homogeneous test material of 1% Cd, 20% Pb, and 30% Zn was prepared and was sprayed on the leaves. Plastic coverings were used to prevent the dusts from falling on the soil. With the Cd concentration between 30 and 300 ppm, the Cd accumulation in the grains was about 1.15 ppm; but when the concentration was more than 1000 ppm, the accumulation in the grains increased drastically. When 25 ppm cadmium sulfide solution was sprayed on the leaves, the amount of accumulation in the grains differed depending on the time of spraying. The crucial time seemed to be the time of the formation of the ear and the beginning of ripening. The mutual effects between Cd-Zn, Cd-Pb, and the secondary multiplication effects of Cd-Pb-An were all clear, and there was a significant difference with less than 1% danger rate. The accumulation of Cd in the grains was offset by Zn, but the presence of Pb multiplied the Cd accumulation

27234

APTIC NO. 48878

Ota, Yasuo, Saburo Shibukawa, and Renpei Kamino

CROP DAMAGE BY AIR POLLUTION IN SAITAMA PREFECTURE AND CHEMICAL PREVENTIVES.

(Saitama-ken ni okeru kokogaku sumoggu ni yoru sakumotsu higai no hassei jokyō to sushu yakuzai no koka ni tsuite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 231. (Nov. 7-9, Paper 185.)

Photochemical smog damage to scallions were observed in southeastern Saitama in the areas adjacent to Tokyo. The preventive effects of ascorbic acid, glutathion, and asolbin acid were examined by spraying 10 ppm solutions on the scallions. The effect of a 0.5% solution of thiophanate methyl was also examined by treating the soil with the solution. The photochemical smog damage in its initial stage showed an oily, waxy texture on the scallion leaves; when the damage advanced, the tips began to wither, and chlorosis and curling began to appear. The damage could be cured in the initial stage. The chlorosis and the curling of leaves occurred in the same direction. The heaviest damage occurred in the SWW, followed by the SW. As a damage preventive, thiophanate methyl had the most notable effect. Ascorbic acid, glutathion, and asolbin acid also showed a slight effect compared to the damage in the control area.

27235

APTIC NO. 48728

Shinozaki, Mitsuo

AN INVESTIGATION OF HEAVY METALS ON AND IN THE TREE LEAVES IN KAWASAKI. (Kawasaki shinai no jumoku yomen fuchaku busshitsu oyobi yochu no jukinzoku nado ni tsuite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 224. (Nov. 7-9, Paper 178.)

Samplings of the tree leaves from three parks in Kawasaki city were examined each month between May and Dec. 1971 to see the effects of sulfur dioxide and settling particles. The metal content in the dusts on the surfaces of leaves and the metal and sulfur content in the leaves were measured. Metals were measured by the atomic absorption analysis method, and the sulfur content was measured by the atomic absorption analysis method, and the sulfur content was measured by the sulfur automatic analyzer. The average amounts of settling particles on leaves in the industrial area were 400-1600 mg/l sq m, in the commercial area 200-1400 mg/l sq m, and in the residential

area (suburbs) 100-800 mg/l sq m. The metal content decreased with the increase of the total amount of dusts. Iron and manganese ratios were clearly higher in the industrial areas. The ratios of iron, zinc, copper, nickel, lead, and manganese in the settling particles were 1.9-25.8% in the industrial areas, 1.8-12.5% in the commercial areas, and 0.2-10.7% in the suburbs. The metal content in the leaves were 1277 ppm in the industrial area, 534 in the commercial area, and 390 in the suburbs. The Zn counts were 90, 82, and 60 ppm, respectively; Cu counts were all 9 ppm; Ni measurements were 7, 6, and 4 ppm; Pb measurements were 11, 10, and 7 ppm; and Mn measurements were 178, 51, and 74 ppm. In the industrial area, there was a tendency for water-soluble sulfur to increase in the leaves of ginko and pasania with the time. An index for pollution may be obtained by examining the relationship between water-soluble sulfur and the total sulfur.

27236

APTIC NO. 48876

Suzuki, Nobutaka, Akira Kurosawa, and Chikara Wada

STUDIES OF THE INFLUENCE OF SULFUR DIOXIDE ON VARIOUS CROPS (I). (*Kakushu sakubutsu ni taisuru arysan gasu no eikyo (daiippo), yobun kyushu ni oyobosu arysan gasu no eikyo*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 228. (Nov. 7-9, Paper 182.)

The effects of low-concentrations sulfur dioxide on various crops were studied. Spinach, white vegetable, vitamine green, snow green, barley, and wheat were exposed to 1 ppm of sulfur dioxide for a long time. Various degrees of damages were manifested in the order of seriousness of white vegetable, vitamine green, barley, spinach, wheat, and snow green. The first two green vegetables showed the signs of chlorosis after 45 hr of exposure; barley leaves began to curl and show discoloration; spinach, wheat, and snow green showed no effects at this time, but in about 100 hr, all the plants began to show abnormalities. The first three specimens showed complete chlorosis on 70% of total leaves. About 30% of the leaves on the three other specimens showed damages. The exposure to SO₂ seemed to damage not so much of nutrition absorption, but the formation of roots, leaves, and stalks. The synthesis of protein was very much damaged.

27237

APTIC NO. 48875

Taniyama, Tetsuro and Kazuo Sawanaka

THE EFFECT OF SULFUR DIOXIDE ON THE GRAIN PRODUCTION OF RICE PLANTS. (*Suito no shijitsu seisan ni oyobosu arysan gasu (SO₂) no eikyo*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 227. (Nov. 7-9, Paper 181.)

Experiments were conducted to study the effects of sulfur dioxide on the growth of rice plants. A number of flower pots with two grains each of rice were started in April 1971 and the plants were cultivated under natural conditions. Various groups of plants were given a 80-hour exposure to SO₂ gas in late July and early August and from the middle to late August when the grains and flowers formed. The effects of the SO₂ accumulation in the leaves were examined. The sulfur content in unpolished rice was examined. The experiments clearly showed that SO₂ impaired homogenization and photosynthesis of the rice plants, and decreased the activity for the formation of roots and stalks. However, the effect of SO₂ on the formation of rice grains was not clear.

27238

APTIC NO. 48550

Thorne, Linda and George P. Hanson

SPECIES DIFFERENCES IN RATS OF VEGETAL OZONE ABSORPTION. *Environ. Pollut.*, 4(3):303-312, Oct. 1972. 8 refs.

The ability of several plant species to absorb ozone was compared. Plant shoots were placed in water, sealed in 1-liter

chambers, and exposed for 4 hr to air with a constant ozone concentration. The ozone was produced by passing activated charcoal-filtered air over ultraviolet lights, and the concentration was controlled by the light intensity. Each chamber contained an inlet and an outlet for airflow and a device for measuring water uptake by the plant shoot. Ozone concentrations in outlet air were measured by bubbling the air through a neutral buffered potassium iodide solution and reading the absorbance of the released iodine on a colorimeter. Leaf surface area was measured photometrically. All plant shoots reduced ozone concentration in the fumigation chambers. The amount of reduction depended primarily on leaf surface area, leaf physiological age, leaf diffusion resistance, and plant species. Herbaceous species absorbed more ozone than woody species, and actively growing woody tissue was a much more efficient absorber than dormant tissue. There was a strong positive correlation between absorption rate and transpirational water loss. Since temperature and humidity were constant, diffusion resistance was a linear function of transpiration. This suggests that the ozone absorption potential of plants can be measured in the field with instruments that accurately measure stomatal aperture.

27239

APTIC NO. 48688

Wallin, Jack R. and Daniel V. Loonan

LIVE PLANT DETECTION OF AIRBORNE SPORES OF HELMINTHOSPORIUM MAYDIS RACE T IN THE FIELD. *Plant Disease Repr.*, 56(8):659, Aug. 1972.

Live corn seedlings can be used to indicate the presence of viable spores of *Helminthosporium maydis* Nisikado and Miyake Race T, the southern corn leaf blight pathogen. Air samplers were run to detect airborne spores, while pots containing corn varieties were exposed to the air for 37 days; subsequent infection indicated that spores were trapped by the plant on 22 days. Coincident temperature, relative humidity, dew, and rainfall data were taken to identify those meteorologic factors favorable for spore production and release of the corn leaf blight fungus. Spore counts did not correlate with seedling disease data. For example, during a 3-day exposure period, 34 spores were trapped and no plants were infected, and during another 3-day period, 15 spores were caught and the exposed plants were infected. Meteorologic factors did not appear to influence the spore content of the air as indicated by spore samplers and live plants.

27240

APTIC NO. 48806

Weigand E., M. Kirchgessner, W. Graenzner, and K. Ranft

THE FEEDING OF LARGE AMOUNTS OF SULPHITE TO LACTATING COWS - TOLERANCE TO SULPHUR DIOXIDE AND SULPHUR DIOXIDE CONTENT OF MILK. (*Zur Fuetterung hoher Sulfitmengen an Milchkuhe - Schwefeldioxidvertraeglichkeit und Schwefeldioxidgehalt der Milch*). Text in German. *Zucker*, 25(23):748-753, 1972. 20 refs.

Fodder is often used to feed cattle which is contaminated with sulfur dioxide due to the method of preparation. The fodder is usually contaminated with SO₂ from combustion gases during the drying process. The sulfite concentration in the fodder depends on the fuel used for combustion and on the operating conditions in the drying drum. On the average, the concentration is about 800 mg SO₂/kg dry pulp. The sulfite tolerance of lactating cows and its influence on the sulfite level in milk was studied on four animals receiving 2 kg/day of pellets of dried beet pulp containing 10.2 g SO₂/kg. The intake of 18.4-20.2 g SO₂/cow/day for 110 days had no deleterious effect on milk production or milk fat level. Over a period of 15 weeks, the average sulfite level was 1.53 mg SO₂/l of milk. This SO₂ concentration did not differ statistically from the mean level of 1.39 mg SO₂/l of milk in the total milk of 60 cows in the milking herd. At the middle and the end of the experiment, the sulfite levels in the blood were low and did not exceed the levels in four control cows. Urine sulfite levels were also rela-

tively low (mean value 6.5 mg SO₂/l) but somewhat higher than in the controls (2.8 mg SO₂/l). Experimental and control cows were examined clinically before, half way through, and at the end of the experiment. There were no statistical differences between control and experimental cows with respect to behavior, body temperature, heart activity, and rumen motility. Sulfite feeding also had no effect on the hematocrit, hemoglobin, red and white blood cell counts, and serum enzyme activity (GOT, GPT, LDH). All urine samples were free from protein.

27241

APTIC NO. 48725

Yamaga, Mineo, Kaoru Omori, Kazunori Abe, and Takashi Tozawa

THE EFFECTS OF AIR POLLUTANTS ON VEGETATION - THE EFFECTS OF OZONE ON CARBOHYDRASE. (Taiki osen no shokubutsu ni oyobosu eikyo - tosuikai koso e no ozon no eikyo). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 230. (Nov. 7-9, Paper 184.)

The effects of ozone on the carbohyrase of plants were examined by both in vivo and in vitro experiments using young shoots of cucumber and kidney beans. Ozone was led into an exposure chamber which was kept at 20 C, humidity 50%, and 1000 lux. The concentration of ozone was maintained at 0.5 ppm, checked by the neutral potassium iodide continuous automatic meter. The roots were exposed for 2 hr; immediately after that 1.0 g of leaves was measured and homogenized with distilled water. Ammonium sulfide was added and the precipitation was analyzed. The pH of sucrose of the cucumber was approximately 4.5, that of beans was about 5.0, and the beta-amirase of the beans was 5.5. Acetic acid buffer liquid containing 2% sugar was added and reacted at 30 C and the carbohyrase activities were measured. The vitro experiments showed a clear effect of ozone, lowering activities of all the enzymes. The deterioration rate of cucumber sucrose was 25% in 5 min, whereas the control group deteriorated only 5%. In 10 min the control group activity lowered 10%, and the exposure group lowered 40%. The activities of sucrose and beta-amirase of kidney beans also lowered 20% in 5 min and 40% when the control group lowered 12%.

27242

APTIC NO. 48724

Yatazawa, Michihiko, Katsuhisa Furuhashi, and Satofumi Tanaka

EXPERIMENTAL STUDIES ON THE PLANT DAMAGE BY SULFUR DIOXIDE (REPORT NO. 6), THE REDUCTION MECHANISM OF PHOTOSYNTHETIC ACTIVITIES IN PLANTS EXPOSED TO SULFUR DIOXIDE. (Aryusan gasu ni yoru shokubutsu higai no jikkenteki kenkyu (dairoppu), Tansan kotei koso no aryusan ni yoru sogai yoshiki ni suite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 229. (Nov. 7-9, Paper 183.)

The blocking of the activity of ribulose carboxylase in plants by sulfur dioxide was reported previously. Further studies were made on the recovery damages. Ribulose-1, 5-diphosphate carboxylase was prepared from spinach. The lowering of activity occurred when sulfur trioxide blocks the SH radical of the enzyme protein. The results were compared by adding sodium sulfite to the liquid at the time of reaction, and by pretreating the enzyme liquid with the same concentration of Na₂SO₃ at 4 C instead of adding it at the time of reaction. The pretreatment of enzyme resulted in far less damage to the photosynthesis. Further experiments by diluting the enzyme liquid indicated an even clearer tendency. The enzyme disruption by SO₃ will recover by simply lowering the concentration of SO₃ in the liquid. The difference in enzyme activities were compared by dialyzing the solution. The dialysis clearly resulted in the recovery of activity.

EFFECTS-MATERIALS

1972

27243

APTIC NO. 48706

Birks, N. and D. L. Hewson

THE EFFECT OF SULPHUR DIOXIDE ON THE PLASTICITY AND ELECTRICAL PROPERTIES OF COPPER OXIDES. *Werkstoffe Korrosion*, 23(9):777-778, Sept. 1972. 4 refs. (Presented at the Mechanische Eigenschaften und Haftung von Zunderschichten und ihr einfluss auf die Oxydation von Metallen, Duesseldorf, West Germany, Dec. 16-17, 1971.)

The effect of sulfur dioxide on the plasticity and electrical properties of copper oxides was investigated. The presence of SO₂ in oxidizing atmospheres increased the oxidation rate of copper at 700-1000 C. At high SO₂ partial pressures, this was due to the formation of the basic sulfate which formed a liquid eutectic with the CuO phase. At SO₂ partial pressures lower than that required for basic sulfate formation, the increase was due to increased cation diffusion rates caused by dissolution of sulfur in both Cu₂O and CuO leading to an increase in the concentration of cation vacancies. (Author abstract modified)

27244

APTIC NO. 48605

Dorset, B. C. M.

THE TEXTILE COLOURIST AND FINISHER. *Text. Mfr.*, 99(1172):27-29, 31, Oct. 1972.

The fading of dyed acetate, cotton polyester, and nylon fabrics by ozone and/or nitrogen oxides is discussed. Acetate fabrics are protected against nitrogen oxides by bis(phenylamine) compounds, which can be applied by printing methods using sodium alginate as a thickener. Cotton polyester fabrics are protected against ozone by treatment with a Koratron D.P. finishing liquor containing dimethylol-dihydroxy-ethylene urea, a polyethylene softener, and nitrate catalysts. The dyeing process which precedes D.P. finishing consists of applying disperse dyes to the polyester fibers by padding with a liquor containing a mixture of red, yellow, and blue dyes. These are fixed by thermosol treatment at 190-220 C. The cotton may then be optionally dyed with a fast vat dye resistant to ozone fading. Acetate, cotton polyester, and nylon fabrics dyed with ozone-sensitive Disperse Blue 27 are protected against fading by heat treatment to give a more uniform and deeper dyeing. Ethyleneoxy-substituted tertiary amines can be incorporated in nylon fibers to give them protection against ozone.

27245

APTIC NO. 48944

Feliu, S., M. A. Guillen, and P. Fernandez Manzano

STEEL CORROSION BY THE AIR IN MADRID AS AFFECTED BY HUMIDITY AND SULFUR DIOXIDE POLLUTION. (Influence de l'humidite et de la contamination par l'anhydride sulfureux sur la corrosivite de l'atmosphere de Madrid sur l'acier). Text in French. *Corrosion*, 20(7):474-482, Nov. 1972. 8 refs.

The effects of relative humidity and sulfur dioxide concentrations on the rate of the corrosion of steel were studied by systematic corrosion loss measurements conducted in Madrid during the Feb. 1968-May 1970 period. Steel plates of 5-10 cm were exposed to free atmosphere over 1-month periods at 35 different points in Madrid, where monthly averages of the SO₂ concentration also were measured by lead dioxide cylinders, with measurement data obtained in mg/sq m/day of sulfur trioxide. The number of days in each month with a minimum relative humidity of 50, 60, and 70% was also recorded. The corrosion rate data obtained show a close relationship with both SO₂ concentration and relative humidity, the correlation factors for corrosion rate and SO₂ concentration, determined for each month, ranging from -0.07 to 0.79. The corrosion rates were lowest in June, July, and August, and highest in

November, December, and January. The minimum and maximum corrosion rates were 5.5 and 850 mg/sq cm/mo of iron. The corresponding SO₂ concentrations were 0.24 and 2.47 mg/sq cm/day of SO₃ while the numbers of hours with a minimum relative humidity of 70% were 6 and 696 hr, respectively. Coincidence of the months with maximum and minimum relative humidity with the months with maximum and minimum SO₂ concentrations was observed.

27246 APTIC NO. 48790

Johnson, Noye M., Robert C. Reynolds, and Gene E. Likens
ATMOSPHERIC SULFUR: ITS EFFECT ON THE
CHEMICAL WEATHERING OF NEW ENGLAND.
Science, 177(4048):514-516, Aug. 11, 1972. 22 refs.

The acidity and sulfur content of the upland streams of New England can be accounted for by the rainout and washout of sulfuric acid from the atmosphere originating from sulfur dioxide produced during the combustion of fossil fuels. Rain and snow at Hubbard Brook, New Hampshire, contained an average of 3.1 mg/l sulfate and had an associated pH of 4.1. Over a 3-year period, rain and snow in the Northeast contained an average of 4.3 mg/l sulfate with an associated pH of 4.4. Normal precipitation has a pH of only 5.7. Data are given on the composition of surface waters of the Hubbard Brook, Maritime Provinces, and New England areas. Weathering is an important source of minerals in surface water. Carbonation weathering reactions or congruent solution of minerals, or both, are realized on a regional scale and are the primary processes responsible for most of the observed cationic denudation. Although higher weathering rates are expected at higher pH levels of rainwater, Hubbard Brook had a relatively slow weathering rate. A contributing cause may be the maturity of the soil at Hubbard Brook. In spite of the excess acid over New England, the rate of cationic denudation of upland watersheds is relatively low.

27247 APTIC NO. 48939

Levshunov, R. T., L. F. Khramov, and A. A. Novikov
DIRT DISCHARGE TENSIONS OF INSULATORS
UNDER SWITCHING OVERVOLTAGE CONDITIONS.
(Gryazerazryadnye napryazheniya izolyatorov pri kommutatsionnykh nerenapryazheniyakh). Text in Russian. *Elektr. St. (Moscow)*, no. 12:66-68, Dec. 1972. 8 refs.

The effect of dirt buildup on the discharge voltage of insulators under switching overvoltage conditions was studied on insulators with a dry buildup composed of sodium chloride suspended in clay, the surface weight being 3.5 mg/sq cm. The discharge voltage was practically a linear function of the dirt surface resistivity. Increased probability of chain flashover in areas with high pollution levels due to reduced insulator discharge voltage under switching overvoltage conditions was determined. Insulators with an increased number of chains should be used in such areas, and the inner overvoltage should be reduced to a level endurable for the insulation.

27248 APTIC NO. 48524

Mohler, J. B.
HOW TO AVOID PITFALLS WHEN EVALUATING
CORROSION RESISTANCE. *Mater. Eng.*, 76(5):54-56,
Oct. 1972.

Corrosion resistance tests are discussed. Chemical and electrochemical characteristics of common metals and alloys are presented as a guide to testing. Corrosion mechanisms and cells may offer clues to which tests should be applied, whether an immersion test, a salt spray test, pit measurement, or the use of an electrical current to induce or inhibit corrosion. Each form of corrosion, including uniform, deep and shallow pit, and intergranular, and each test method are described. Examples of tests on zinc and cadmium plated steel panels are given. Corrosion tests should be standardized. A good corrosion testing program can spot problems before they occur in

service and provide a means of selecting the right material or materials for a particular service or environment.

27249 APTIC NO. 48768

Mohler, J. B.
ANALYZING ATMOSPHERIC CORROSION. *Pollut. Eng.*,
4(7):28-29, Oct. 1972.

Structural metals deteriorate by reaction with moisture, gases, and pollutants in the atmosphere. Corrosion is accelerated by sulfur dioxide, salt, dust, soot, and soils. Solids will attract and retain moisture and promote the formation of tiny corrosion cells on the surface. Corrosion rates of steel and zinc panels were measured in rural, rural-marine, semi-industrial, semi-rural, marine, industrial, industrial-marine, and urban atmospheres.

27250 APTIC NO. 48711

Robinson, W. G.
DEVELOPMENTS IN PORCELAIN INSULATORS:
REVIEW OF CURRENTLY AVAILABLE INSULATORS FOR OVERHEAD LINES AND ELECTRICAL EQUIPMENT. *Elec. Rev. (London)*, 191(14):435-438, Oct. 6, 1972. 6 refs.

Recent developments in insulators for overhead lines and terminal equipment stem from two sources: the increase in mechanical strength of electrical porcelain and improvements in ceramic techniques which permit the manufacture of pieces of greater strength and thickness. The higher strength porcelains now available are especially useful for overhead line insulators, solid core post insulators, and highly stressed hollow insulators. In areas where there is a combination of industrial and/or saline pollution with frequent occurrence of high humidity, creepage distance is an important factor in insulator pollution performance. Creepage distance can be increased by providing deep ribs on the underside of the insulator shed, or by using closely spaced plain sheds. Where there is a combination of dust or salt deposit with a low frequency of rainfall, insulators of simple shape give better service than those with deeply ribbed sheds. Semiconducting glazes represent another approach to the pollution problem. They stabilize the voltage distribution along the length of the insulator and prevent the formation of highly stressed dry bands which lead to pollution flashover on normally glazed insulators.

27251 APTIC NO. 48661

Spence, J. W. and F. H. Haynie
CHEMICAL ATTACK AND ECONOMIC ASSESSMENT
OF AIR POLLUTANTS ON EXTERIOR PAINTS. *J. Paint Technol.*, 44(574):70-74, Nov. 1972. 17 refs.

The degradation of exterior paints by sulfur dioxide and particulate matter and the associated potential economic loss to manufacturers and consumers was investigated by surveying published studies and paint market data. The potential annual loss to the consumer for four classes of exterior paints is \$700 million, and damage loss for household paints is 75% of that total. However, dose-response service life data crucial to the accuracy of such an estimate are lacking. A research program has been initiated to determine the best techniques for assessing initial degradation of exterior paints that can be correlated with actual service life. The effects of ozone and SO₂ at ambient concentrations on selected exterior paints will be studied (Author conclusions modified)

EFFECTS-ECONOMIC

1973

27252

APTIC NO. 49027

Mehta, D. C. and B. L. Crynes

HOW COAL-GASIFICATION COMMON BASE COSTS COMPARE. *Oil Gas J.*, 71(6):68-71, Feb. 5, 1973. 11 refs.

Process design and variables and comparative base costs are reviewed for various coal gasification-methanation processes. A typical process includes coal pretreatment, gasification, char removal and treatment, shift conversion, acid gas removal, sulfur recovery, methanation, and drying. Processes at the more advanced stage of development include the carbon dioxide acceptor process, the two-stage superpressure Bigas process, and Hygas process and the Lurgi process (minus methanation). Flow sheets are also included for the molten-salt process, the synthane process, and the coal-solution-gasification process.

1972

27253

APTIC NO. 48897

NEW RULES DULL SOLVENTS SHEEN. *Chem. Week*, 111(20):35-37, Nov. 15, 1972.

More and more states and local governments are adopting regulations, based on Los Angeles County Rule 66 or Environmental Protection Agency standards, restricting the use of solvents. The major solvents restricted so far are aromatics, branched-chain ketones, and trichloroethylene. As the market for methyl isobutyl ketone, which has been most affected by regulations, declines, the market for uncontrolled oxygenated solvents such as methyl ethyl ketone may show a temporary rise. Ultimately hydrocarbon solvent systems will be replaced by water-based, 100%-solids, and powder-coating systems that require no air pollution control equipment. Most trichloroethylene produced in the U. S. is used in metal degreasing; with a decline in trichlor production, markets for perchloroethylene and 1,1,1-trichloroethane may grow through 1980.

27254

APTIC NO. 48979

CLEAN-AIR DRIVE CREATING IMPOSSIBLE OIL-SUPPLY JOB. *Oil Gas J.*, 70(46):93-95, Nov. 13, 1972.

The effect of the clean-air drive on oil supply and demand is discussed. A study indicated that 6,150,000 b/d of additional oil will be in demand in 1975, bringing the total estimated demand to 25,800,000 b/d, if air quality standards and regulations are not changed. Three sources of added crude-oil demand were noted: 1,750,000 b/d from unsatisfied gas demand or curtailment of gas service; 3,700,000 b/d to cover the shortage of low-sulfur coal created by present and scheduled air pollution standards; and 700,000 b/d due to lower compression ratios in autos necessitated by lead-removal and auto emissions demands. The implications of increased demand on domestic production and imports are reviewed. Low-sulfur coal, natural gas, and gasoline, their efficiency for power production, and their impact on crude oil are discussed. The percentage of total kilowatt capacity with the use of coal, oil, gas, nuclear power, and multiple fuels in electric power plants is considered. New policies on coal, imports, and gas, and an investigation of synthetic natural gas and liquefied gas are suggested to alleviate the demand on crude oil.

27255

APTIC NO. 48931

Burke, Donald P.

CATALYSTS: PART I: PETROLEUM CATALYSTS. A COMPREHENSIVE LOOK AT \$168-MILLION/YEAR BUSINESS HEADED FOR SPECTACULAR GROWTH. *Chem. Week*, 111(18):23-27, 30, 32-33, Nov. 1, 1972. 7 refs.

AIR POLLUTION ABSTRACTS, MAY 1973

The 73% increase in refining capacity projected for 1980 should mean substantial new sales for petroleum refining catalysts. Estimates of future catalyst consumption are given for five petroleum refining processes: cat cracking, cat reforming, hydrotreating, hydrocracking, and alkylation. The market for hydrotreating catalysts may double in 5-9 yr as a result of increased demand for low-sulfur fuel oils. For better nitrogen removal as well as sulfur removal, the preferred catalyst is a nickel-molybdenum mixture. Molecular sieve catalysts are reducing the incentive for hydrocracking and allow refiners to meet increasing demands for gasoline without increasing cat cracking capacity. Alkylation capacity is growing but the trend is to make more efficient use of the sulfuric acid and hydrofluoric acid catalysts required for the alkylation process. New bimetallics that permit operations at lower pressure are revolutionizing cat reforming. Isomerization could be a substantial market for petroleum catalysts by 1980. Other new markets for catalysts are the catalytic muffler and the production of substitute natural gas (SNG) from liquid petroleum feedstocks. If mufflers are required on 1975 model vehicles, the catalyst market would be 320 million in 1975. The market for SNG catalysts is estimated at \$5.6 million in 1975 and \$30 million in 1990.

27256

APTIC NO. 48906

Katell, Sidney and William C. Morel

AN EVALUATION OF CITRATE ABSORPTION PROCESS FOR THE REMOVAL OF SO₂ FROM FLUE GAS. *Proc. Am. Petrol. Inst., Div. Refining*, vol. 52:215-227, 1972. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

The economics of the installation and operation of a sodium citrate absorption system were evaluated for the removal of sulfur dioxide from flue gas from a 1000-megawatt power plant, assuming the use of a 3% sulfur coal in one case and a 4% sulfur residual oil in the other case; 95% recovery of input sulfur; and an operating factor of 7000 hr/yr. The capital investment was estimated at \$26,280,000 and \$25,380,000, with removal cost, after credit, at 1.126 and 1.094 mills/kw-hr for the coal and oil, respectively. Process design and operation and the estimated cost data are examined. (Author abstract modified)

27257

APTIC NO. 48624

Rowland, Les

SULPHUR RECOVERY PLANTS IN ALBERTA COULD FACE \$500 MILLION CLEAN UP BILL. *Oilweek (Calgary Can.)*, 23(36):9, 12, Oct. 1972.

The cost of increasing the operating efficiency of a sulfur recovery gas plant to 99.5% of the elemental sulfur in the gas stream and of reducing stack emissions to 500 ppm was estimated at \$500 million. The cost details of the effort to comply with government regulations are reviewed.

STANDARDS AND CRITERIA

1973

27258

APTIC NO. 49006

THE MAXIMUM ALLOWABLE EMISSION STANDARD FOR PCB IN THE COMBUSTION GAS OF PCB AND OTHER MATTERS. (PCB nado o shokiyaku shobun suru baai ni okeru haigasuchu no PCB no zantei haishutsu kyoyo genkai ni tsuite) Text in Japanese. Kankochō Kogaisenmon Shiryo (Public Nuisance Gaz.), 8(1):61-62, Jan. 1973.

The temporary emission standard for polychlorinated biphenyl (PCB) combustion and the measurement method for PCB are given. The concentration of PCB in the flue gas from PCB

STANDARDS AND CRITERIA

27264

combustion must be less than 0.25 mg/cu m (or less than 0.15 mg/cu m from liquid PCB combustion facilities). The average concentration of PCB in the flue gas from PCB combustion must be less than 0.15 mg/cu m (or less than 0.10 mg/cu m from liquid PCB combustion facilities). The average concentration is obtained by measuring PCB concentrations three times in 48 hours.

1972

27259

APTIC NO. 48867

Ministry of Transportation, Tokyo (Japan)

PARTIAL REVISION OF ORDINANCE NO. 62 OF THE MINISTRY OF TRANSPORTATION ON SAFETY STANDARDS FOR HIGHWAY TRANSPORTATION, VEHICLES, AND INSTRUCTIONAL DATA ON AUTOMOTIVE EMISSION EXHAUST 1973 REGULATIONS. (*Doro unso sharyo no hoan kijun ichibu kaisei (Unyusho-rei dai 62-go) oyobi jidosha haishutsu gasu showa 48-nen kisei setsumei shiryō*). Text in Japanese. 13p., Dec. 1972.

Revisions are given on the safety standards of carbon monoxide, hydrocarbons, and nitrogen oxides in automotive exhaust. The CO, HC, and NO_x standard were revised to 26.0 g/km, 3.80 g/km, and 3.00 g/km, respectively, for general and small vehicles under 2.5 tons (excluding light vehicles with 2-cycle engines) using gasoline as a fuel; to 18.0 g/km, 3.20 g/km, and 3.00 g/km, respectively, for the same categories of vehicles using liquefied petroleum gas as a fuel; and to 26.0 g/km, 22.5 g/km, and 0.50 g/km, respectively, for light vehicles with 2-cycle engines using gasoline or liquefied petroleum gas as a fuel. Revisions were also given on the coefficients for the determination of the three pollutants in the exhaust gas from vehicles at different running conditions.

27260

APTIC NO. 48464

Coughlin, H. B. and B. J. Steigerwald

PERFORMANCE STANDARDS FOR NEW AND MODIFIED SOURCES AS THEY AFFECT THE PETROLEUM INDUSTRY. *Proc. Am. Petrol. Inst. Div. Refining*, vol. 52:430-439, 1972. 6 refs. (Presented at the American Petroleum Inst., Div. of Refining, Midyear Meeting, 37th, New York, May 8-11, 1972.)

The basis for development of standards of performance for new or modified stationary sources of air pollution are reviewed. The methods used to establish standards and those standards being developed or planned for development which affect the petroleum industry are examined. Guidelines for standard development and review procedures are discussed. Performance standards in the planning for fluid catalytic cracking unit catalyst regenerators, process heaters, boilers, storage vessels, and flares that burn process gas generated within the refinery are examined.

27261

APTIC NO. 48623

Gildenskiold, R. S., M. I. Gusev, and F. I. Dubrovskaya

HYGIENIC EVALUATION OF THE LIMITING PARAMETERS IN INDUSTRIAL PLANT-GENERATED AIR-POLLUTING EMISSIONS. (*Gigiyenicheskaya otsenka limitiruyushchikh pokazateley vybrosov ot promyshlennyykh predpriyatiy v atmosferyy vozdukh*). Text in Russian. *Gigiena i Sanit.*, no. 10:76-79, Oct. 1972. 2 refs.

Hygienic evaluations of maximum allowable emissions, determined for planning and design of industrial facilities, are discussed. The maximum allowable emission, determined for specific atmospheric dispersion conditions, prevents the maximum allowable pollutant concentration from being exceeded. Maximum allowable emissions have been determined for closed groups of point sources, but they can also be applied to extended agglomerations of point sources by the introduction of certain coefficients. The maximum allowable emission

charts are recommended as an auxiliary means for use in planning industrial plants and facilities to secure maximum allowable pollutant concentrations in planned industrial and adjoining inhabited areas.

27262

APTIC NO. 48648

Peterson, D. H.

AIR POLLUTION CONTROL AND THE AUTOMOBILE.

Can. Controls Instrum., 11(9):42-43, Sept. 1972.

Canadian Federal, U. S. Federal, and California automobile emission standards are shown, and sampling and analytical procedures used in the certification of new vehicles are reviewed. The Canadian emission standards require a 25% reduction in nitrogen oxides by 1973 and a 90% reduction in carbon monoxide and hydrocarbons by 1973. Constant volume sampling techniques require instruments with high accuracy at low ppm ranges. Long cell non-dispersive infrared analyzers are used for CO and carbon dioxide measurements; flame ionization detectors for hydrocarbons; and chemiluminescent analyzers for nitrogen oxides. To meet 1975 emission standards, automobiles will be equipped with control devices such as thermal reactors, dual catalytic converters, air injection systems, and positive crankcase ventilation valves. Lead additives in gasoline will be reduced considerably or eliminated altogether by 1975. A program of highway inspection of automobile emissions will probably be adopted by Canadian provinces.

27263

APTIC NO. 48593

Petryanov, I. V., F. G. Kotkov, Ye. N. Teverovskiy, and A. V. Terman

THE PROBLEM OF THE HYGIENIC STANDARDIZATION OF THE POLLUTION OF THE ENVIRONMENT UNDER SCIENCE AND TECHNOLOGY REVOLUTION CONDITIONS. (*Problema gigiyenicheskogo normirovaniya zagryazneniya vneshney sredy v usloviyakh nauchno-tekhnicheskoy revolyutsii*). Text in Russian. *Gigiena i Sanit.*, no. 10:79-83, Oct. 1972. 4 refs.

Principles of the hygienic standardization of environmental pollution in view to the specific requirements of the scientific and technological revolution are outlined. The principle of the absolutistic demand for the absence of any pollution is both unrealistic and unacceptable, and as such should be abandoned in favor of accepted pollution levels standardized on the basis of potential, reasonably tolerable hazards. Protection of the present and of coming generations should be the basis of hygienic standardizations. Both maximum allowable pollutant concentrations and maximum allowable pollutant emissions should be determined. Maximum allowable emissions which are able to secure the maximum allowable concentrations can be determined from the latter and from meteorological or hydrological parameters, of which dilution factors, to be determined at high degree of accuracy, are a basic element.

27264

APTIC NO. 48543

Ruckelshaus, William D.

STANDARDS AND TEST PROCEDURES FOR LIGHT DUTY DIESEL MOTOR VEHICLES. *Federal Register*, 37(193):20914-20923, Oct. 4, 1972.

The Environmental Protection Agency proposes to extend emission standards for gasoline fueled light duty vehicles to diesel-fueled light duty vehicles, beginning with the 1975 model year. Analytical procedures and instrumentation for measurement of hydrocarbon, carbon monoxide, and nitrogen oxide emissions from new diesel fueled vehicles are described. Rules for dynamometer test runs and for mileage accumulation and emission tests on each engine family are specified. Exhaust emissions from 1975 diesel engines are not to exceed 0.41 g/mi for HC, 3.4 g/mi for CO, and 3.1 g/mi for NO_x. Test vehicles, maintenance, compliance with emission standards, and analytical system calibration are described.

LEGAL AND ADMINISTRATIVE

1973

27265

APTIC NO. 48527

HOW A CITY SETS ITS ANTIPOLLUTION RESTRICTIONS. In: *Sanitation Industry Yearbook. Solid Waste Management, Refuse Removal Journal*, 10th ed., 1973, p. 92; 96, 100.

New York City's new Air Pollution Control Code permits mechanically operated grinders to be installed in dwellings served by separate sanitary sewers fed to a sewage treatment plant. The code requires that multiple dwellings higher than three stories install and operate a refuse compacting system. With the exception of hospitals, biological laboratories, and other medical facilities, the code prohibits the installation of refuse burning equipment. Incinerator operators must install an auxiliary gas burner regulated by automatic firing clocks, over-fire air fan and nozzle systems, and control apparatuses such as a scrubber. A schedule of permit fees has been established for installation or alteration of refuse burning equipment. Incinerators other than municipal can operate only between 7 am and 5 pm.

27266

APTIC NO. 48708

JURISDICTION AND MINE ADMINISTRATION. THE QUESTION OF TAX EXEMPTION FOR UNITS SERVING THE MAINTENANCE OF CLEAN AIR. (Aus *Rechtsprechung und Bergverwaltung. Zur Frage der Bewertungsfreiheit fuer Anlagen, die der Luftreinhaltung dienen*). Text in German. *Glueckauf* (Essen), 109(1):94-95, 1973.

According to paragraph 82 of the income tax regulations, units which serve the maintenance of clean air are tax deductible. In the case of a mine, however, where the operation was switched from a mound to a shaft furnace, the revenue office declined this privilege. It was argued that the shaft furnace, although less air polluting than the mound because it carried the waste gases into larger heights through a stack, was used also for production and did not merely serve the cause of waste air cleaning. The administrative court to which the case was appealed upheld the ruling of the revenue bureau.

27267

APTIC NO. 48796

Miyazawa, Kazutaka

CONSOLIDATION OF INDUSTRIAL POLLUTION CONTROL SYSTEMS. (Sangyo kogi boshu taipei no seibu). Text in Japanese. *Tsusansho Koho* (Gaz. Minist. Int. Trade Ind.), no. 6944, Part 2 21-26, Jan. 12, 1973.

The progress of industrial pollution legal system development, the purposes, a summary of regulations, factories that require pollution control personnel by law, the training of qualified pollution control personnel, the duties and authorities of pollution control personnel, and budgets for pollution control systems are discussed. The number of factories designated as pollutant sources in each Prefecture, and the number of qualified personnel to be appointed at those factories are given in a table. The qualifications are classified into four grades. In all Japan, 177 of class one, 288 of class two, 1091 of class three, and 2392 of class four personnel are required for control of air pollution. In addition, 240 for noise control and 1958 for dust control are required. Those who passed the air pollution control qualification tests given by the Ministry of International Trade and Industry in 1972 numbered for class one, 4625; class two, 904; class three, 1035; class four, 1626; noise, 5296; and dust 597. For supervisory positions, 2871 individuals passed the test. A total of 11 177 persons received training for air pollution control management, and 8123 persons for dust control, and 186 persons for noise control for 1971 and 1972. Three hundred and fifty one persons finished the training for supervisory positions in 1971 and 1972. The budget for 1973

AIR POLLUTION ABSTRACTS, MAY 1973

for all classes of industrial pollution control system is \$406,666.

27268

APTIC NO. 48777

Urashima, Masatoshi

GENERAL PRELIMINARY INVESTIGATION OF 1973 INDUSTRIAL POLLUTION. (48 nendo no sangyo kogi sogo jizen chosa). Text in Japanese. *Tsusansho Koho* (Gaz. Minist. Int. Trade Ind.), no. 6945: 21-26, Jan. 13, 1973.

Programs for general preliminary investigations on industrial pollution enforced by the Ministry effective 1965 are described. The objects of the investigation are air pollution centering on sulfur oxides and water pollution. The investigation includes information collection on location plans and meteorological conditions, discussion of investigation method by a panel, local investigations on meteorological conditions of diffusion, air tracer experiments, measurements of the inversion layer, wind tunnel experiments, analyses of data, preparation of reports, and coaching of local public organizations. The air tracer experiment is performed by hanging a generator from helicopter and spraying fluorescent product from a height of 200-500 m (effective stack height) at a rate of 100 g/hr. The product is then collected by an air sampler and measured by irradiating it with ultraviolet. The wind tunnel experiment is carried out by using a 1/2500 model and giving the conditions of stack height, velocity of flue gas, and wind velocity. In 1969 a simulation model for air pollution was also developed.

1972

27269

APTIC NO. 48684

THE ATTACK ON POLLUTION. *Cem. Lime Gravel*, 47(10):231-232, Oct. 1972.

Measures taken to improve amenities and counter air, water, and land pollution in England are discussed. Smoke control regulations and reductions in smoke output are reviewed. Coal-burning in homes accounts for over three-quarters of the smoke output, even with 83% of London homes converting to smokeless fuel. Improvements occurring in the emissions of particulate matter from cement and iron and steel works, reductions of the output of grit and dust from power stations, and the reduction in the number of coal-fired kilns in potteries are reviewed. Exhaust fumes from automobiles is considered as a future problem.

27270

APTIC NO. 48757

ONE UNLEADED GASOLINE DUE JULY 1, 1974. *Oil Gas J.*, 70(44):26, Oct. 30, 1972.

Rules regulating lead-free gasoline issued by the Environmental Protection Agency are discussed. Some revisions were made to make the regulations more workable for refiners and marketers. Lead-free gasoline was defined as motor fuel containing no more than 0.05 g/gal of lead antiknock additive. The revised rules reduce the phosphorus trace level from the originally proposed 0.01 to 0.005. No limits have yet been set on sulfur content. The widespread introduction of a lead free, phosphorus free grade of gasoline is timed to coincide with the availability of 1975 model autos, which may be equipped with catalytic mufflers to achieve the required 90% reduction in emissions of carbon monoxide and hydrocarbons. The averaging provision scheduling lead phaseout with a year's grace for small refiners is discussed. New data concluding that atmospheric lead is a health hazard was cited by eight senators who feel the lead reduction schedule, designed to reduce use of the additive by 60.6% by 1977, is inadequate.

27271

APTIC NO. 48788

Conway Research, Inc., Atlanta, Ga.

GEORGIA BRIDGING THE GAP BETWEEN ECONOMIC IMPERATIVES AND ENVIRONMENTAL INTEGRITY. *Site Sel. Handb.*, vol. 2:116, 1972.

Although the Georgia Department of Industry and Trade administers one of the biggest budgets in the country to attract new industry, the department will work only with firms whose prospective plants in Georgia will meet State and Federal water, air, and noise pollution regulations. In the matter of industrial pollution, the department works closely with the Air and Water Quality Control Sections in the Department of Natural Resources. The 1972 air and water quality standards developed by the two Sections are shown. Enforcement of the standards and regulations governing solid waste disposal is the responsibility of the Environmental Protection Division of the Department of Natural Resources. The 1972 standards tightened the original 1968 regulations, particularly with respect to ambient air standards and particulate matter from fuel-burning installations. New air quality and emission standards were set for sulfur dioxide, smoke, fluoride, and particulate emissions, asphaltic mix plants, Portland cement plants, nitric acid and sulfuric acid manufacturing plants, conical burners, incinerators, and cupola furnaces. Additional standards for fertilizer plants and cotton gins and source monitoring became effective in Sept. 1972. The new water quality standards tightened controls over thermal pollution, dissolved oxygen, and bacteria. State progress in water pollution control, surface mine reclamation programs, pesticide control, and solid waste management is described. Research programs of the Institute of Ecology and the Institute of Natural Resources, University of Georgia, are discussed.

27272

APTIC NO. 48846

Osaka Municipal Office (Japan)

A SUMMARY OF THE ENFORCEMENT MEASURES FOR AIR POLLUTION EMERGENCIES IN NISHI-YODOGAWA WARD. (*Nishi-yodogawa-ku taiki osen kin-kyu taisaku jissai gaiyo*). Text in Japanese. 18p., Oct. 1972.

Enforcement measures for pollution emergencies including air pollution by sulfur oxides and particulates, water pollution, noise pollution, and vibration pollution are given. There were 1783 factories under the supervision of moving squads, among them 518 factories were air pollution-related. In 1967, the total SO_x discharged by the industries in this ward was 961.1 N cu m/hr. This was cut down 64%, or to 347.5 N cu m/hr in 1971. The average particulate concentration measured at one monitoring station decreased from 0.17 mg/cu m in 1969 to 0.106 mg/cu m in 1970 and to 0.097 mg/cu m in 1971. All the factories required on improvement of their operation conditions, which occupied more than 50% of the total factories, had accomplished the requirement at the end of 1971. The total cost of the enforcement operation was about \$100,000.

27273

APTIC NO. 48980

Japan Environmental Agency

ADDITIONS TO THE LIST OF THE FUEL CONTROL AREA AND REVISIONS ON THE STANDARDS OF FUEL CONSUMPTIONS, BASED ON REGULATION NO. 15 OF THE AIR POLLUTION CONTROL LAW.

(*Taiki osen boshi-ho dai 15-jo no kitei ni motozuku nenryo shijo kisei chiiki no tsuika oyobi nenryo shijo ni kansuru kijun no kaisei ni tsuite*). Text in Japanese. 9p., Nov. 1972.

Center city areas of Chiba and Fukuoka cities were added to the previous center city areas of 10 cities including Sapporo, Sendai, Tokyo, Yokohama, Kawasaki, Nagoya, Kyoto, Osaka, Kobe, and Amasaki as the fuel control areas, and the control areas in Sendai, Tokyo, and Kyoto, and Osaka were enlarged, from 10 wards to 23 wards in Tokyo and nine wards to 22 wards at Osaka. The previous standard of sulfur content in fuel of 1.0-1.5% was revised to 0.5-1.2%. Thus in the control areas the users must use the fuels of the best quality.

27274

APTIC NO. 48586

Byrd, J. F.

ORGANIZING A CORPORATE AIR POLLUTION CONTROL PROGRAM. *Mech. Eng.*, 94(11):25-28, Nov. 1972. (Presented to the American Society of Mechanical Engineers Power Division.)

Companies with plants and mills at several different localities must tackle air pollution control on a multilevel basis. Each plant and mill must have its own air pollution control engineer; his intimate knowledge of the processes and equipment and of the local political climate is indispensable to a successful control program. On the other hand, an air pollution control staff engineer at headquarters is also indispensable because of his broad knowledge of the many processes, laws, rules, regulations, and all the technology involved. The staff and plant air pollution control engineers must work as a team in interpreting and implementing local rules and regulations, determining the public relations implications of various plant effluents, inventorying plant air pollution sources, evaluating waste reduction methods, and indoctrinating supervisors and workers in abatement methods. At the corporate level, the engineers responsible for air pollution control, water pollution control, and solid waste disposal should be integrated into one team. It is also important that staff environmental engineers keep in close communication with public relations and legal divisions at headquarters.

27275

APTIC NO. 48993

Cheremisinoff, Paul N.

ESTABLISHING A CENTRAL CORPORATE DEPARTMENT FOR COMPANY-WIDE POLLUTION CONTROL. Preprint, 5p., Dec. 1972. (Presented at the International Pollution Engineering Congress, Cleveland, Ohio, Dec. 4-6, 1972, Paper 25a.)

The organizational structure of a pollution control group in a large multiplant company, and its relationships with other groups in the company are discussed. Possible criteria for the groups structural design, degrees of responsibility, corresponding duties, communication with line personnel, and for staffing the group are presented. As a preliminary, guidelines are given for developing a control program, from the identification of the pollutant problems to start-up and operation of control facilities. An example of a pollution control policy statement is given.

27276

APTIC NO. 48719

Gaessler, Willi

EUROPEAN ENVIRONMENTAL PROBLEMS AND SOLUTIONS--AIR POLLUTION. Preprint, 5p., 1972. (Presented at the International Pollution Engineering Congress, Cleveland, Ohio, Dec. 4-6, 1972, Paper 8b.)

Air pollution regulations adopted and proposed for West Germany and for the European Economic Community as a whole are reviewed. Under existing West German laws, licenses are required for the construction and operation of plants and installations that generate large amounts of pollutants. Sulfur oxides emissions will be limited as soon as flue gas desulfurization processes are developed. Maximum emission values will be set or reduced for dusts, SO₂, nitrogen oxides, carbon monoxide, hydrocarbons, hydrogen sulfide, and fluorine and chlorine compounds. Limits have been established for CO and HC in automotive exhausts, and gasoline can contain no more than 0.4 g lead/l. Present (1969) and projected (1980) annual emission rates of the major air pollution sources in West Germany are summarized. The European Commission recognizes the need for a common policy in the field of air pollution control and has proposed a number of joint research and development projects. Activities to be carried out in 1973 are described.

Gerber, Jeffry C. and Peter W. Kitson

COMPULSORY LICENSING OF PATENTS UNDER THE CLEAN AIR ACT OF 1970. *J. Pat. Off. Soc.*, 54(10):650-688, Oct. 1972. 193 refs.

Section 308 of the 1970 Clean Air Act provides for the mandatory licensing of patents upon certification that the use of the patent is necessary to meet emission standards set by the Act; the patent is not otherwise available to potential licensees; no reasonable alternative means of achieving these reduced levels exist; and to deny such licensing would promote a lessening of competition. The most economically important and administratively complex applications of this mandatory licensing provision are to motor vehicle emission and fuel standards. Implementation of the provision has created serious problems for international trade and commerce, threatened private control of patent rights, and reduced incentives to procure new patents in the area of motor vehicle and engine emission devices. These problems are analyzed and less drastic alternatives are suggested. These alternatives include voluntary licensing, dedication or disclaimer, licensing with grant-back clauses; and administrative or judicial action.

Hartkopf, Guenter

DECONTAMINATION OF AUTOMOBILE EXHAUSTS.

(Entgiftung von Autoabgasen). Text in German. *Tech Umweltmag.*, no. 6:20-22, Dec. 1972.

An opinion sampling in the Federal Republic of Germany indicated that 46% of the population thinks that the decontamination of automobile exhausts is at present the most urgent requirement for improving the ambient air. The member states of the Common Market have agreed on a program of eradicating all obstacles in interstate commerce. This forms a basis for passage of uniform regulations concerning exhaust gas decontamination in member states. It guarantees that automobiles crossing the border of the Federal Republic of Germany from other member states will not emit more pollutants than the automobiles in Germany. It may not be overlooked, however, that any adjustment of the regulations to the technological progress will become more difficult because changes or additions to the guidelines must be approved by the qualified majority of member states. The first Common Market regulation for decontaminating engines was passed Oct. 1, 1971. It limits the quantity of carbon monoxide and hydrocarbons emitted during a drive through a European city as well as the hydrocarbon emissions from the crankcase. On Aug. 2, 1972 a further guidelines was issued by The Council of the European Community limiting the emissions from diesel engines. It must go into effect in all member states within 18 months.

Inoue, Tsutomu, Makoto Tani, Hiraoka Toshiro, Takashi Masuda, Hideo Fujii, Shutaro Takeya, and Yoshio Watanabe

AIR POLLUTION CONTROL PLANS IN OSAKA CITY. NO. 3: AIR POLLUTION CONTROL IN KONOHA-KU. (*Kurin ea puran (Osaka shi taiki osen boshi keikaku kihon koso) sono 3: Konohana-ku tokubetsu taisaku ni tsuite*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 159. (Nov. 7-9, Paper 114.)

An almost 100% improvement has been made in the Konohana district of Osaka according to the city's guidance and public nuisance control plans for the last several years. Further improvements in the air quality are expected to be made in 1972, in order to meet the entire environmental standards based on the Clean Air Plan. According to the recommendations of the Total Energy Investigation Council of Dec. 1969, the standard of the average of 0.55% sulfur content fuel was to be met by 1967 in congested areas. However, the city of Osaka is striving

to meet this standard especially in the Konohana district within 1972. The total fuel consumption in 1969 by six companies and nine plants in this area was 772 billion t/yr. The environmental concentration of sulfur oxides was 0.068 ppm. In 1971, it decreased to 0.065 ppm, and the total sulfur oxide emission quantity decreased by 43%. In 1972, the total average sulfur content in the fuel is expected to be 0.45%, and the total sulfur oxide emission is to be decreased by 69%, which will enable the district to reach the environmental standard of 0.05 ppm throughout the year.

Jarrett, Steven R.

HOW THE STATES STACK UP IN POLLUTION CONTROL: MANPOWER, MONEY AND LEGISLATIVE MANDATE. *Ind. Develop.*, 141(5):2-6, Sept./Oct. 1972. 5 refs.

The states are ranked according to the individual categories of air and water pollution control spending, water pollution control laws, and air pollution control personnel for several years. For 1971, an average rank is also assigned to each state. The ranking system used balanced out personnel and spending figures for the states by dividing them on the basis of area, population, total expenditures, and number of manufacturers in the state. Among the states most committed to air pollution control are California, the New England states, and the Great Lake states.

Kirsch, H., R. Staehr, K. Schwinkowski, and K. -H. Buchta

THE COOPERATION BY HYGIENE AUTHORITIES AT CONTRACT AGREEMENTS BETWEEN LOCAL AUTHORITIES AND EMITTERS - AN EFFICIENT CONTRIBUTION TO THE MAINTENANCE OF CLEAN AIR. (*Die Mitwirkung der Hygieneorgane bei Vertragsabschlüssen zwischen örtlichen Räten und Emittenten - ein wirksamer Beitrag zur Luftreinhaltung*). Text in German. *Z. Ges. Hyg. Ihre Grenzgebiete (Berlin)*, 18(12): 950-952, 1972. 13 refs.

Governmental measures for improvement of the working and environmental conditions in the German Democratic Republic require active cooperation between the government organs, the industrial and commercial enterprises, and the hygiene authorities. Through contract agreements between emitters and local authorities, a stepwise reduction of the air pollution was achieved in Erfurt. Sixty-four agreements have been signed to date. In 33 contract agreements the combustion process in steam generators was regulated and improved. Limit values were worked out for the various emitters. Bonuses for improvement of the combustion process or fines for neglecting measures are applied to promote actions.

Ling, Joseph T.

BALANCING ENVIRONMENTAL OBJECTIVES WITH AVAILABLE RESOURCES: WHAT ARE THE REALITIES. Preprint, 12p., 1972. (Presented at the International Pollution Engineering Congress, Cleveland, Ohio, Dec. 4-6, 1972.)

Current environmental legislation does not attempt to balance its objectives with available resources or to balance individual segments of the environment, such as air, water, and land. The Water Pollution Control Act of 1972, for example, requires the use of the best available technology with the final goal of eliminating the discharge of pollutants to navigable waterways. For one plant to bring its wastewater up from secondary treatment to the standard of drinking water, the company and its chemical and electrical suppliers will need 40,000 t/yr of additional natural resources. This will produce 19,000 t/yr of pollutants and 90 billion Btus of heat. The pollutants generated will include 1300 tons of sulfur dioxide, 250

LEGAL AND ADMINISTRATIVE

27289

tons of nitrogen oxides, and various sludges that will require disposal on land. The cost for the additional treatment will be four or five times more than the total expenditure for the present primary and secondary treatment facility, which meets current water pollution control requirements.

27283

APTIC NO. 48884

Nawata, Hiroshi

IMPACT OF NATIONAL POLLUTION-CONTROL POLICIES ON INTERNATIONAL AFFAIRS. *Chem. Economy Eng. Rev.*, 4(9):35-37, Sept. 1972.

The mechanics of international trade with respect to the technico-economic movement of industrial pollution are discussed. The impact of national pollution control policies on international affairs are reviewed, including the effects of transnational pollutants, product standards, international environmental standards, and export prices. In 1971, about 500 million dollars were spent on equipment such as dust collectors, fuel oil desulfurization, scrubbers, afterburners, and tall stacks. The production of pollution control equipment for water contamination, solid waste disposal and incineration, and noise is also discussed. The levels of water, soil, and plant contamination by substances such as heavy metals, cadmium, and polychlorinated biphenyls in Japan and the United States are listed.

27284

APTIC NO. 48525

Nonhebel, G

BRITISH AIR POLLUTION. 1. SUPERVISION BY LOCAL AUTHORITIES. *Polytech. Tijdschr., Ed. Procestechniek (The Hague)*, 27(18):605-610, Aug. 30, 1972. 11 refs.

The second British Clean Air Act, 1968, is administered by local authorities of town and urban districts covering many villages. Representatives from the local authorities serve on two Clean Air Councils appointed by the Government minister responsible for air pollution control (one Council for England and Wales and one for Scotland). The local authorities must determine that chimneys on new factories, or chimneys serving rebuilt and enlarged furnaces, are high enough for dissipation of sulfur dioxide, fine dust, and fumes in flue gases. Chimney height is governed by charts that relate height to SO₂ emission rate at full load up to 820 kg/hr SO₂ or 200 t/hr steam. The authorities may require measurement of grit and dust emissions from boiler plants and furnaces. If the results are considered excessive, the owner may be required to reduce the nuisance by any practicable means. Control of odors by local authorities is difficult because of the absence of objective measurements of odor and problems of enforcing provisions requiring suitable equipment for collection of odors.

27285

APTIC NO. 48913

Nonhebel, G.

BRITISH AIR POLLUTION REGULATIONS. 2. CONTROL OF HEAVY INDUSTRY BY HER MAJESTY'S ALKALI AND CLEAN AIR INSPECTORATE. *Polytech. Tijdschr., Ed. Procestechniek (The Hague)*, 27(19):631-635, Sept. 1972. 5 refs.

By 1971, 60 processes were registerable under the British Alkali Act and thus required to use the best practicable means to reduce pollutant emissions. Presumptive (i.e., permissible) emission limits for these processes are laid down by the Alkali Inspectorate, which determines maximum emission concentrations from new and existing works on the basis of plant size, its age and expected life, and local conditions. Once the minimum practicable emission in terms of mass and concentration is secured, its height of discharge is arranged to secure an acceptably low ground-level concentration. When authoritative medical rulings are not available, the concentration taken is usually 1/30 of the concentration recommended for 8-hour occupational exposure in factories. Account is also taken of con-

centrations that are known to cause damage to vegetation. The calculated ground-level concentration from the chimney emission is the 3-minute maximum concentration using a standard wind speed of 6 miles/sec and taking into account the thermal rise of the plume. The major classes of processes registered under the Alkali Act are chemical and allied industries, acid sludge and chemical incineration works, metal industries, fuel industries, works releasing radioactive emissions, and industries such as cement production and carbon black works. Presumptive limits for some of these processes are shown.

27286

APTIC NO. 48629

Ruckelshaus, William D.

ADMINISTRATOR'S DECISION ON APPLICATIONS FOR SUSPENSION OF 1975 AUTOMOBILE EMISSION STANDARDS. AVAILABILITY OF TECHNICAL APPENDIX. *Federal Register*, 37(146):15193, July 28, 1972.

The applications of five automobile manufacturers for a 1-year suspension of the 1975 new motor vehicle emission standards for light-duty vehicles were denied by the Environmental Protection Agency. The EPA decision mentioned that an appendix setting forth a detailed analysis of vehicle test data submitted by applicants and other witnesses would be issued in the near future. That appendix is now available from the Office of Public Affairs, Public Inquiries Branch of the EPA.

27287

APTIC NO. 49000

Ruckelshaus, William D.

APPROVAL AND PROMULGATION OF STATE IMPLEMENTATION PLANS; EXTENSION OF PERIOD FOR COMMENT. *Federal Register*, 37(173):18041, Sept. 6, 1972.

Proposed regulations to correct deficiencies in several State plans for implementation of national ambient air quality standards were published by the Environmental Protection Agency on July 27, 1972. The regulations proposed for applicability to nonferrous smelters have engendered substantial response such that the 30 days provided for comment are not adequate for evaluation of the bases of the proposals and preparation of comments thereon. Accordingly, the period for comment on some proposed regulations has been extended to Oct. 15, 1972.

27288

APTIC NO. 48994

Simons, Edward L. and William F. Marx

GOVERNMENT AGENCY AND COMPANY RELATIONS -- COMPANY ORGANIZATION, POLICIES, PRACTICES AND PROCEDURES. Preprint, 7p., Dec. 1972. (Presented at the International Pollution Engineering Congress, Cleveland, Ohio, Dec. 4-6, 1972, Paper 13b.)

The organization of a multiplant company to provide its manufacturing plants with assistance in complying with environmental legislation is described. Policies, practices, and procedures which the company has found most effective in ensuring compliance are presented. A complete list of sources of information on legislation and regulations, on proposed measures as well as those already in force, is given. The list includes state and federal agencies, and private services, including newspapers, magazines, trade associations, and professional societies.

27289

APTIC NO. 48626

Stassen, Jean and Yvon Put

THE FIGHT AGAINST AIR POLLUTION. A COLLECTION OF LEGISLATION AND REGULATION TEXTS WITH BRIEF COMMENTS. (*La lutte contre la pollution atmosphérique. Recueil des textes législatifs et réglementaires avec commentaires succincts*). Text in French. *Ann. Mines Belg.*, no. 10:911-1020, Oct. 1972.

Economic and social policies of pollution control are discussed. The Commission of European Communities has

27290

been engaged in establishing pollution control programs. Legislative texts and regulations are given. Domestic heating, motor vehicles, and industry are the main sources controlled by Belgium law. Motor vehicles are required to have adjustments and maintenance so that no more than 4.5% of carbon monoxide content is given off when the motor is run slowly. Motor vehicle test procedures are outlined. Domestic heating is controlled by emission standards for heating devices and special urban zoning. Mining, steam generating plants, and other industries are subject to permits and fuel standards. The Administration of Mines and the Administration of Working Security inspect the industries. A special law controls radioactive radiation.

27290

APTIC NO. 48717

Veldhuis, K. H.

A BETTER ENVIRONMENT -- MAKING NECESSITY COMPATIBLE WITH ECONOMIC FEASIBILITY: THE MULTI-NATIONAL COMPANY AND THE ENVIRONMENT. Preprint, 10p., 1972. (Presented at the International Pollution Engineering Congress, Cleveland, Ohio, Dec. 4-6, 1972, Paper 16.)

The typical multi-national company has at its disposal a tremendous amount of information on environmental matters. This information covers everything from national policy trends to the design of control devices for specific effluent streams. Properly handled, this information enables the factories across the world to set high standards of efficiency in pollution control by applying the best internationally available technology. This in turn influences competitors, leading to a general increase in pollution control efficiency. The availability of this type of help is particularly important in developing countries. It enables the multi-national company to work with consultative bodies advising governments on legislation and standards. The environmental control program at Unilever Ltd., and its cost, is discussed.

27291

APTIC NO. 48927

Winton, John M.

PLANT SITES. *Chem. Week*, 111(15):35-39, 42-50, 54, 56, Oct. 11, 1972.

Concern about future energy resources, environmental problems, and the economic climate are now dominant factors in site selection. The shortage of power reserves is critical for the chemical process industries, which are the biggest users of industrial power. Since new plants can be the target of environmentalists, the strongest trend in the chemical industry is toward expanding at existing sites. There is also increasing interest in coastal sites, which offer better air pollutant dispersal and in industrial parks and other areas for which environmental impact statements have been improved. The states are compared with respect to industrial power costs, availability of chemical raw materials, labor availability and costs, solid waste disposal legislation, trends in air pollution control, and financial incentives to industry. Comparative data are also presented on the costs of shipping by rail, truck, ocean tanker, and barge.

AIR POLLUTION ABSTRACTS, MAY 1973

SOCIAL ASPECTS

1972

27292

APTIC NO. 48470

Chiba Prefectural Government (Japan), Dept. of Health
Pollution Control

REPORT ON AN INVESTIGATION OF PREFECTURAL CITIZENS CONSCIOUSNESS OF PUBLIC NUISANCE.

JULY 1971. (Kenmin no kogai ishiki chosa hokokusho, Showa 46-nen 7-gatsu) Text in Japanese. 75p. July 1972.

Questionnaires were sent to 3000 men and women of ages between 20 and 69 in eight cities and townships of Chiba Prefecture in order to investigate opinions and attitudes toward public nuisance. The period of investigation was March 20 to April 20, 1971. The response rate was 45.5%, predominantly obtained from males (64.4%) mostly in their 30s and 40s. Seventy-two percent of the answers said that they thought of air pollution in terms of public nuisance, and 41.2% thought of water pollution and noise. Ninety percent of the people answered they were interested in reading the Prefecture's report on pollution. As to the cause of pollution, 58.8% blamed the lack of responsibility on the part of industries; 40.1% blamed the lack of governmental policy, and 28.2% blamed individuals lack of a sense of public morality. Fifty-nine percent of the people felt they were victimized by pollution, and 26% felt they were free from damage. Males in their 30s to 50s especially felt they were victimized. About 18% of the total replies said that the degree of pollution was unbearable; 43% said that they were annoyed but could get along; 38.2% of people receiving damages blamed air pollution and 27.4% blamed noise. The compilation of answers is presented.

GENERAL

1972

27293

APTIC NO. 48715

Bond, G. C.

MIASMATOLOGY: LAWS OF ENVIRONMENTAL POLLUTION. *Chem. Brit.*, 8(6):247-251, June 1972. 7 refs.

All aspects of environmental pollution and its control can be treated as scientific phenomenon which obey two fundamental laws. The first law holds that environmental pollution will result from improper disposal of process waste products, including those originating from impurities in the input. The second law holds that any pollutant emitted to the biosphere will become diluted to the maximum extent possible, and that diluted pollution is untreatable. Recognition of the first law will lead to more efficient ways of minimizing by-product formation and of recovering those waste products whose occurrence is inevitable. Recognition of the second law will lead to pollution control at the source. Areas where such control might be advantageous are readily biodegradable packaging materials and domestic sewage and liquid industrial effluent treatment.

SUBJECT INDEX

A

ABATEMENT

26995, 27087, 27088, 27198, 27254, 27269,
27271, 27279, 27281, 27282, 27289, 27290,
27293

ABSORPTION

26781, 26883, 26844, 26981, 26994, 27010,
27028, 27042, 27052, 27063, 27077, 27082,
27136, 27149, 27174, 27230, 27238

ABSORPTION (GENERAL)

26854, 26857, 26870, 26873, 26876, 26888,
26891, 26927, 26928, 26932, 26944, 26972,
26973, 26974, 26975, 26980, 26995, 27154,
27149, 27256

ACETALDEHYDE

27056

ACETYLENES

27166

ACID SMUTS

27036

ACROLEIN

26970, 27056, 27131, 27132, 27161

ACUTE

27213, 27218, 27224

ADHESIVES

26996

ADSORPTION

26801, 26860, 26888, 26904, 26914, 26929,
26941, 26949, 26982, 26990, 26991, 26993,
27009, 27026, 27037, 27053, 27156, 27171,
27151, 27175

ADSORPTION (GENERAL)

26873, 26880, 26881, 26927, 26995, 27088

ADVISORY SERVICES

27088, 27290

AERODYNAMICS

26897, 27148

AEROSOL GENERATORS

27047, 27159

AEROSOLS

26767, 26801, 26805, 26836, 26897, 26898,
27023, 27024, 27032, 27075, 27079, 27091,
27108, 27114, 27118, 27122, 27123, 27124,
27137, 27138, 27139, 27153, 27160, 27164,
27170, 27197, 27209

AFRICA

26834

AFTERBURNERS

26777, 26769, 26808, 26809, 26832, 26840,
26851, 26862, 26867, 26879, 26884, 26886,
26896, 26899, 26905, 26912, 26913, 26915,
26922, 26934, 26948, 26960, 26961, 26962,
26963, 26964, 26969, 26970, 27255, 27262,
27270

AIR CONDITIONING EQUIPMENT

26807, 26821, 26990, 27104, 27200

AIR POLLUTION EPISODES

26933, 26984, 27132, 27192, 27272

AIR POLLUTION FORECASTING

27109, 27116, 27127, 27134, 27135, 27145,
27146

AIR QUALITY CRITERIA

27183, 27191, 27213, 27215, 27261, 27263

AIR QUALITY MEASUREMENT

PROGRAMS

26842, 27019, 27072, 27086, 27087, 27088,
27089, 27090, 27093, 27094, 27095, 27096,
27097, 27100, 27101, 27102, 27106, 27107,
27111, 27112, 27113, 27114, 27120, 27121,
27126, 27127, 27129, 27135, 27143, 27198,
27227, 27228, 27232, 27292

AIR QUALITY STANDARDS

26821, 27021, 27087, 27085, 27110, 27191,
27198, 27261, 27263, 27271, 27279, 27285,
27287

AIR RESOURCE MANAGEMENT

26887, 27001, 27282, 27290, 27293

AIR-FUEL RATIO

26797, 26817, 26849, 26843, 26884, 26885,
26899, 26915, 26922, 26846, 26960, 27152

AIRCRAFT

26806, 26815, 26818, 27119

ALCOHOLS

26767, 26856, 26977, 26988, 27040, 27181,
27189

ALDEHYDES

26767, 26797, 26799, 26840, 26895, 26970,
27001, 27056, 27061, 27112, 27115, 27131,
27132, 27161, 27150

ALERTS

26933, 27272

ALKALINE ADDITIVES

26855, 26857, 26873, 26888, 26907, 26921,
26923, 26927, 26928, 26965, 26972, 26973,
26974, 26980, 26984, 27036, 27037

ALLERGIES

27218

ALUMINUM

26848, 26995, 27003, 27095

ALUMINUM COMPOUNDS

27091

ALUMINUM OXIDES

26860, 26936, 27003, 27167

ALVEOLI

27184, 27196, 27197, 27209

AMINES

27046, 27062, 27173, 27179, 27205, 27211

AMINO ACIDS

27195

AMMONIA

26768, 26799, 26804, 26896, 26948, 26973,
27004, 27027, 27036, 27040, 27043, 27166,
27151

AMMONIUM COMPOUNDS

26768, 26799, 26804, 26896, 26948, 26973,
27001, 27004, 27027, 27036, 27040, 27043,
27166, 27151

ANIMALS

26903, 27183, 27184, 27186, 27190, 27194,
27196, 27199, 27201, 27179, 27205, 27206,
27208, 27211, 27213, 27214, 27215, 27240,
27219

ANTHRACENES

27041, 27199

ANTICYCLONES

27107

AREA SURVEYS

26842, 27086, 27087, 27088, 27089, 27090,
27093, 27094, 27095, 27096, 27097, 27100,
27101, 27102, 27106, 27111, 27112, 27113,
27114, 27120, 27121, 27126, 27127, 27129,
27143, 27227, 27228, 27232, 27292

ARIZONA

27128

AROMATIC HYDROCARBONS

26833, 26840, 27078, 27131, 27132, 27157,
27161, 27162, 27175, 27283

ARSENIC COMPOUNDS

26830, 27018

ASBESTOS

26821, 27180

ASHES

26861, 27007, 27167

ASPHALT

26859, 27271

ASPXYXIATION

27181

ASTHMA

27021, 27212, 27217, 27218

ATMOSPHERIC MOVEMENTS

26798, 26803, 26842, 27037, 27091, 27095,
27103, 27106, 27107, 27111, 27112, 27113,
27114, 27115, 27116, 27117, 27119, 27120,
27121, 27126, 27127, 27128, 27129, 27130,
27134, 27135, 27140, 27105, 27141, 27143,
27147, 27225, 27234

AUSTRALIA

26812, 26818, 26843, 26902

AUTOMATIC METHODS

26786, 26869, 26919, 26958, 27032, 27040,
27056, 27072, 27074, 27077

AUTOMOBILES

26776, 26784, 26790, 26806, 26815, 26824,
26827, 26835, 26836, 26839, 26890, 26910,
26955, 26969, 27086, 27103, 27181, 27270,
27277, 27286

AUTOMOTIVE EMISSION CONTROL

26776, 26777, 26779, 26784, 26787, 26797,
26804, 26806, 26809, 26811, 26770, 26812,
26817, 26818, 26774, 26827, 26828, 26829,
26832, 26839, 26840, 26843, 26860, 26879,
26884, 26885, 26886, 26890, 26896, 26899

AUTOMOTIVE EMISSIONS

26901, 26910, 26912, 26915, 26922, 26845,
26938, 26943, 26846, 26948, 26955, 26960,
26961, 26962, 26963, 26964, 26967, 26970,
26998, 27000, 27002, 27152, 27181, 27254,
27262

AUTOMOTIVE EMISSIONS

26776, 26777, 26779, 26784, 26787, 26790,
26795, 26797, 26798, 26802, 26808, 26809,
26811, 26770, 26813, 26817, 26771, 26818,
26822, 26774, 26824, 26827, 26828, 26829,
26830, 26832, 26833, 26835, 26839, 26840,
26843, 26860, 26879, 26884, 26885, 26886,
26896, 26899, 26905, 26912, 26915, 26922,
26845, 26938, 26943, 26948, 26960, 26961,
26962, 26963, 26964, 26967, 26969, 26970,
26992, 26998, 27000, 27002, 27041, 27056,
27071, 27074, 27076, 27084, 27086, 27087,
27098, 27099, 27100, 27101, 27103, 27115,
27131, 27132, 27146, 27161, 27151, 27181,
27185, 27203, 27207, 27210, 27214, 27225,
27255, 27259, 27262, 27264, 27269, 27270,
27276, 27277, 27278, 27286, 27289

AZO DYE

27018, 27036

B

BACTERIA

26936, 27226

BAG FILTERS

26864, 26865, 26866, 26869, 26932, 26968,
26997, 27003

BALLOONS

27129

BARIUM COMPOUNDS

26906

BARLEY

27227

BASIC OXYGEN FURNACES

26942, 26976

BATTERY MANUFACTURING

26834

BELGIUM

27289

BENZENE-SOLUBLE ORGANIC MATTER

26840

BENZENES

26833, 27161, 27175

BENZO(a)PYRENE

26830, 26938, 27018, 27041, 27199

BENZOPYRENES

26830, 26938, 27018, 27041, 27093, 27199

BERYLLIUM COMPOUNDS

26830

BESSEMER CONVERTERS

27209

BETA PARTICLES

27014

BIO-ASSAY

27199

BISMUTH COMPOUNDS

27139

BLAST FURNACES

26921

BLENDING

26799, 26920

SI-2

AIR POLLUTION ABSTRACTS, MAY 1973

BLOOD CELLS

27190, 27195

BLOOD CHEMISTRY

27101, 27186, 27187, 27195, 27201, 27202,
27210, 27218, 27240

BLOOD GAS ANALYSIS

27186

BLOOD VESSELS

27204

BODY FLUIDS

27194, 27202

BOILERS

26780, 26782, 26793, 26799, 26812, 26814,
26825, 26854, 26868, 26875, 26893, 26844,
26927, 26935, 26846, 26956, 26959, 26973,
26974, 26976, 27001, 27016, 27036, 27065,
27082, 27284

BONES

27188, 27216, 27217, 27219

BORON COMPOUNDS

27073

BREATHING

27196, 27197, 27207

BRICKS

26789

BROMINE

27051

BROMINE COMPOUNDS

26896, 27079

BRONCHI

27201, 27208, 27209

BRONCHIAL CANCER

27185

BRONCHITIS

26805, 27217, 27218

BUBBLE TOWERS

26883, 26953, 27010

BUDGETS

26923, 27280, 27267

BUILD-UP RATES

26950

BUILDINGS

26773, 26990, 27092, 27099, 27103, 27117,
27121, 27265

BUSES

26790, 26808, 26813, 26828, 26829, 27086,
27207

BUTANES

26789

BUTENES

27131

BY-PRODUCT RECOVERY

26781, 26791, 26792, 26804, 26769, 26814,
26773, 26819, 26823, 26841, 26854, 26855,
26856, 26859, 26863, 26870, 26873, 26876,
26880, 26881, 26882, 26887, 26888, 26889,
26891, 26893, 26907, 26923, 26925, 26927,
26930, 26932, 26940, 26944, 26945, 26966,
26972, 26975, 26976, 26977, 26980, 26848,
26983, 26995, 27001, 27022, 27256, 27252,
27257, 27293

C

CADMIUM

27248

CADMIUM COMPOUNDS

27096, 27099, 27100, 27204, 27222, 27230,
27232, 27233, 27283

CALCIUM COMPOUNDS

26906, 27079, 27091, 27099, 27154, 27167,
27204, 27216, 27217

CALIBRATION METHODS

27023, 27011, 27012, 27013, 27034, 27045,
27050, 27056, 27058, 27065, 27066, 27077,
27079, 27083, 27264

CALIFORNIA

27000, 27071, 27123, 27262

CAMERAS

26771

CANADA

26811, 26821, 26850, 26921, 26946, 26979,
27027, 27135, 27142, 27155, 27158, 27162,
27177, 27188, 27230, 27262

CANCER

26805, 26821, 27142, 27180, 27185, 27188,
27205, 27208, 27211

CARBIDES

26975

CARBON BLACK

26802, 26869, 26873, 26880, 26881, 26888,
26896, 26904, 26905, 26906, 26927, 26929,
26937, 26982, 26990, 26993, 26995, 27175

CARBON DIOXIDE

26768, 26814, 26823, 26923, 26941, 26965,
27026, 27038, 27040, 27055, 27082, 27084,
27110, 27142, 27166, 27177, 27186, 27262

CARBON MONOXIDE

26776, 26779, 26781, 26784, 26787, 26790,
26791, 26799, 26808, 26809, 26770, 26817,
26771, 26774, 26827, 26828, 26836, 26839,
26874, 26884, 26885, 26886, 26893, 26899,
26903, 26912, 26915, 26922, 26923, 26942,
26943, 26952, 26960, 26964, 26965, 26967,
26992, 27002, 27009, 27076, 27040, 27043,
27053, 27067, 27071, 27083, 27084, 27086,
27087, 27085, 27098, 27103, 27106, 27110,
27115, 27149, 27156, 27166, 27171, 27151,
27177, 27181, 27182, 27203, 27207, 27214,
27225, 27259, 27262, 27264, 27270, 27276,
27278, 27289

CARBON TETRACHLORIDE

27040

CARBONATES

26873, 26905, 27154, 27186

CARBONYLS

27229

CARBOXYHEMOGLOBIN

26903, 27181, 27182

CARBURETION

26839, 26915, 26960, 27002

CARBURETOR EVAPORATION LOSSES

27262

CARCINOGENS

26821, 26830, 27180, 27185, 27189, 27199,
27205, 27208, 27211

CARDIOVASCULAR DISEASES

27185, 27204, 27217

CASCADE SAMPLERS

26802, 26971, 27012, 27047, 27060, 27068,
27104

CATALYSIS

26796, 26802, 26874, 26880, 26886, 26905,
26906, 26913, 26925, 26929, 26936, 26944,
26948, 26961, 26962, 26963, 26964, 26969

SUBJECT INDEX

27006, 27125, 27158, 27150, 27168, 27151, 27255

CATALYSTS
26796, 26802, 26874, 26886, 26905, 26906, 26913, 26929, 26936, 26948, 26961, 26962, 26963, 26964, 26969, 27006, 27150, 27168, 27151, 27255

CATALYTIC ACTIVITY
26936, 26948, 26969

CATALYTIC AFTERBURNERS
26777, 26809, 26840, 26886, 26899, 26905, 26912, 26913, 26915, 26922, 26934, 26948, 26960, 26961, 26962, 26963, 26964, 26969, 26970, 27255, 27262, 27270

CATALYTIC OXIDATION
26801, 26873, 26874, 26876, 26905, 26929, 26936, 27006, 27150

CATTLE
27240, 27219

CELL GROWTH
27201

CELLS
27184, 27190, 27194, 27195, 27206

CEMENTS
26863, 26878, 26999, 27070, 27269, 27271

CENTRIFUGAL SEPARATOR
26782, 26791, 26799, 26841, 26852, 26862, 26871, 26877, 26898, 26931, 26939, 26951, 26956, 26958, 26968, 26971, 26997, 26999, 27001, 27003, 27012

CERAMICS
26984, 27250, 27269

CHAMBER PROCESSING
26833

CHARCOAL
26801

CHEMICAL BONDS
26981, 27006, 27156, 27162, 27171

CHEMICAL COMPOSITION
26802, 26805, 26840, 26913, 27032, 27036, 27047, 27051, 27079, 27081, 27091, 27093, 27096, 27099, 27100, 27118, 27167, 27188, 27230, 27235

CHEMICAL METHODS
26792, 26813, 27018, 27019, 27021, 27013, 27035, 27036, 27040, 27053, 27070, 27074, 27083, 27113, 27139, 27146, 27157, 27229, 27238

CHEMICAL PROCESSING
26785, 26788, 26792, 26796, 26799, 26804, 26819, 26820, 26826, 26775, 26830, 26831, 26833, 26850, 26854, 26867, 26868, 26869, 26882, 26887, 26891, 26893, 26911, 26916, 26920, 26930, 26945, 26946, 26952, 26956, 26958, 26972, 26976, 26977, 26989, 26995, 27001, 27005, 27030, 27069, 27088, 27175, 27193, 27255, 27260, 27270, 27271, 27285, 27291

CHIBA PREFECTURE
27090, 27129, 27292

CHLORIDES
27018, 27059, 27099, 27184

CHLORINATED HYDROCARBONS
27040, 27063, 27078, 27253, 27258, 27283

CHLORINE
26792, 26836, 26965, 27069, 27219

CHLORINE COMPOUNDS
26896, 27018, 27059, 27069, 27079, 27099, 27184, 27276

CHLOROSIS
27224, 27234, 27236

CHROMATOGRAPHY
26792, 26941, 27018, 27026, 27027, 27038, 27040, 27041, 27055, 27061, 27063, 27067, 27069, 27071, 27073, 27078, 27084, 27117, 27131, 27262

CHROMIUM COMPOUNDS
26830, 26905, 26969, 27222

CHROMIUM OXIDES
27071

CHRYSENE
27041, 27199

CLIA
27194

CIRCULATORY SYSTEM
27203, 27204, 27214, 27217

CITIZENS GROUPS
27097

CITY GOVERNMENTS
27279

CLEAN AIR ACT
26996, 27277

CLOUD SEEDING
27144

CLOUDS
26767, 27114, 27133, 27223

COAL
26791, 26793, 26800, 26804, 26812, 26830, 26838, 26852, 26853, 26855, 26856, 26861, 26867, 26870, 26871, 26872, 26891, 26894, 26902, 26918, 26940, 26846, 26959, 26980, 26987, 27036, 27167, 27175, 27254, 27256, 27252, 27269

COAL CHARACTERISTICS
26791, 26861, 26940, 26980, 27167

COAL PREPARATION
26781, 26823, 26837, 26852, 26856, 26857, 26861, 26870, 26871, 26907, 26844, 26920, 26935, 26940, 26945, 26980, 26987, 27252

COAL RESOURCES
26804, 26940, 27167

COAL TARS
26820

COBALT COMPOUNDS
26905

CODES
26807, 27001, 27265

COFFEE-MAKING
26854

COKE
26788, 26820, 26830, 26831, 26868, 26870, 26891, 26920, 26945, 26950

COLLECTORS
26782, 26791, 26799, 26841, 26851, 26852, 26862, 26866, 26871, 26877, 26898, 26900, 26923, 26924, 26931, 26933, 26939, 26951, 26956, 26958, 26968, 26971, 26977, 26997, 26999, 27001, 27003, 27012

COLORADO
27139

CONTRACTING

COLORIMETRY
26994, 27018, 27021, 27035, 27040, 27042, 27045, 27046, 27049, 27056, 27058, 27064, 27069, 27070, 27072, 27082, 27083, 27089, 27146, 27231, 27238

COLUMN CHROMATOGRAPHY
27018, 27026, 27073

COMBUSTION
26789, 26791, 26795, 26812, 26771, 26855, 26884, 27152, 27157

COMBUSTION AIR
26793, 26809, 26814, 26774, 26841, 26850, 26899, 26918, 26927, 26931, 26933, 26846, 26971, 27265

COMBUSTION PRODUCTS
26778, 26782, 26788, 26791, 26794, 26799, 26801, 26804, 26805, 26769, 26808, 26812, 26814, 26820, 26830, 26831, 26836, 26837, 26841, 26842, 26843, 26850, 26852, 26854, 26855, 26857, 26858, 26861, 26862, 26863, 26866, 26867, 26870, 26872, 26873, 26875, 26876, 26877, 26878, 26880, 26881, 26882, 26887, 26888, 26889, 26891, 26893, 26903, 26905, 26906, 26907, 26909, 26910, 26917, 26918, 26919, 26844, 26921, 26923, 26925, 26927, 26928, 26930, 26932, 26934, 26935, 26939, 26942, 26944, 26946, 26952, 26958, 26968, 26972, 26973, 26974, 26975, 26976, 26978, 26980, 26981, 26847, 26848, 26983, 26984, 26994, 26995, 26997, 26999, 27001, 27003, 27004, 27005, 27006, 27007, 27010, 27016, 27026, 27011, 27029, 27030, 27036, 27037, 27046, 27014, 27050, 27063, 27065, 27066, 27068, 27069, 27070, 27072, 27073, 27082, 27088, 27110, 27126, 27127, 27105, 27147, 27150, 27167, 27240, 27246, 27256, 27257, 27258, 27266, 27276, 27284

COMMERCIAL EQUIPMENT
26832

COMMERCIAL FIRMS
26850, 26852, 26867, 26870, 26871, 26873, 26879, 26916, 26927, 26937, 26946, 26951, 26972, 26977, 27001, 27019, 27274, 27275, 27281, 27286, 27288, 27290

COMMON COLD
27212

COMPLAINTS
27292

COMPRESSION
26777, 26787, 26795, 26797, 26811, 26832, 26885, 26967, 27254

COMPUTER PROGRAMS
26795, 26838, 27116, 27145

COMPUTERS
26811, 26838, 26851, 26926, 27019, 27072, 27116, 27147

CONDENSATION
26768, 26811, 26898, 26914, 26959, 26982, 26849, 27062

CONDENSATION (ATMOSPHERIC)
26767, 27108, 27114, 27123, 27133, 27136, 27170, 27223

CONSTRUCTION MATERIALS
26789, 26803, 26810, 26773, 26853, 26859, 26863, 26878, 26961, 26962, 26963, 26964, 26997, 26999, 27070, 27269, 27271

CONTINUOUS MONITORING
27022, 27026, 27014, 27015, 27057, 27065, 27069, 27072, 27074, 27077, 27084, 27086, 27089, 27120, 27121

CONTRACTING
27281

CONTROL AGENCIES

CONTROL AGENCIES

27270, 27271, 27284, 27285, 27288

CONTROL PROGRAMS

26852, 26909, 26951, 27001, 27088, 27269,
27271, 27273, 27274, 27275, 27276, 27279,
27281, 27267, 27283, 27285, 27287, 27288,
27289, 27290

CONVECTION

26878

COOLING

26834, 26841, 26854, 26862, 26866, 26878,
26882, 26883, 26942, 26985, 26849, 26998,
27000, 27063

COOLING TOWERS

26768, 26801, 26854, 26865, 27169

COPPER

26848, 26983, 27243

COPPER COMPOUNDS

26905, 26969, 27079, 27099, 27100, 27222,
27230, 27235, 27243

CORN

26951, 27239

CORROSION

26927, 26979, 27245, 27248, 27249

COSTS

26781, 26783, 26784, 26807, 26810, 26772,
26819, 26820, 26823, 26825, 26829, 26775,
26837, 26838, 26852, 26856, 26861, 26867,
26872, 26876, 26880, 26881, 26882, 26891,
26898, 26909, 26914, 26917, 26918, 26929,
26930, 26935, 26940, 26944, 26947, 26949,
26957, 26968, 26976, 26980, 26982, 26848,
26983, 26987, 26849, 26989, 26999, 27004,
27030, 27255, 27256, 27252, 27257, 27272,
27283, 27290, 27291

COTTONS

27244, 27271

COUNTER CURRENTS

27128

CRANKCASE EMISSIONS

26915, 27278

CRITERIA

27069, 27082, 27183, 27191, 27193, 27213,
27215, 27260, 27261, 27263, 27264, 27265

CROPS

26816, 26951, 27224, 27227, 27228, 27231,
27233, 27236, 27237, 27239

CRYSTAL STRUCTURE

26969, 27006

CUMULATIVE METHODS

26842, 27015, 27089, 27094, 27127

CUPOLAS

26789, 26830, 26862, 26976, 27271

CYANATES

27046, 27151

CYANIDES

26813, 26820, 26977, 27027, 27064

CYCLIC ALKANES

26767

CZECHOSLOVAKIA

26777, 27098, 27172, 27215, 27229

D

DATA ANALYSIS

27116

SI-4

AIR POLLUTION ABSTRACTS, MAY 1973

DATA HANDLING SYSTEMS

26795, 26838, 27116, 27145

DECISIONS

27281

DECOMPOSITION

27125, 27158

DEGREASING

26914, 27253

DENSITY

27034, 27137

DEPOSITION

27110, 27197, 27209

DESULFURIZATION OF FUELS

26781, 26785, 26799, 26804, 26823, 26837,
26852, 26854, 26856, 26857, 26861, 26870,
26871, 26887, 26893, 26907, 26917, 26844,
26920, 26928, 26933, 26935, 26940, 26945,
26950, 26957, 26980, 26987, 26989, 26995,
27088, 27255, 27252

DIAGNOSIS

27199, 27201

DIESEL ENGINES

26790, 26770, 26829, 26830, 26879, 26915,
26970, 26998, 27000, 27264

DIFFUSION

26798, 26805, 26897, 26941, 27095, 27106,
27109, 27110, 27111, 27116, 27117, 27119,
27121, 27126, 27127, 27135, 27148, 27140,
27105, 27145, 27147, 27168, 27172, 27197,
27209, 27268, 27293

DIFFUSION MODELS

26805, 27109, 27110, 27116, 27117, 27119,
27121, 27126, 27127, 27135, 27148, 27145,
27147, 27168, 27172, 27197

DIGESTERS

27004

DIGESTIVE SYSTEM

27185, 27189, 27204, 27205

DIPHENYLS

27078, 27283

DISPERSIONS

27152

DISSOCIATION

27136, 27171

DISTILLATE OILS

26814, 26856, 26872, 27157, 27165

DOMESTIC HEATING

26782, 26807, 26808, 26772, 26773, 26826,
26838, 27119, 27269, 27289

DROPLETS

26859, 27012, 27108, 27136, 27152, 27159,
27170

DRUGS

27189, 27211

DRY CLEANING

27253

DRYING

26852, 26871, 26889, 26951, 26849, 27240

DUMPS

26977

DUST FALL

26798, 27100, 27104, 27110

DUSTS

26780, 26768, 26791, 26793, 26798, 26800,
26803, 26805, 26808, 26810, 26820, 26836,

26852, 26853, 26863, 26864, 26865, 26866,
26871, 26877, 26878, 26900, 26914, 26919,
26923, 26924, 26931, 26939, 26947, 26953,
26959, 26968, 26971, 26974, 26976, 26847,
26848, 26983, 26997, 26999, 27001, 27005,
27016, 27021, 27011, 27029, 27036, 27040,
27047, 27051, 27068, 27070, 27081, 27088,
27099, 27104, 27110, 27112, 27122, 27128,
27130, 27140, 27168, 27188, 27221, 27226,
27235, 27247, 27249, 27250, 27269, 27276,
27284

DYNAMOMETERS

26824, 26890, 27071, 27264

E

ECONOMIC LOSSES

27251

EDUCATION

27267

ELECTRIC FURNACES

26786, 26789, 26865, 26866

ELECTRIC POWER PRODUCTION

26782, 26768, 26800, 26801, 26807, 26808,
26812, 26814, 26822, 26837, 26838, 26841,
26854, 26855, 26856, 26857, 26868, 26870,
26871, 26875, 26888, 26889, 26891, 26894,
26902, 26907, 26917, 26918, 26844, 26923,
26927, 26928, 26933, 26935, 26976, 26980,
26993, 26995, 27005, 27088, 27090, 27119,
27167, 27169, 27250, 27254, 27256, 27269,
27285, 27291

ELECTRIC PROPULSION

26827, 26915

ELECTRICAL PROPERTIES

26767, 26894, 26897, 26902, 26959, 26968,
27005, 27053, 27077, 27123, 27130, 27243,
27247, 27250

ELECTRICAL RESISTANCE

26894, 26902, 26959, 27053

ELECTRICITY (ATMOSPHERIC)

26767, 27130

ELECTROCHEMICAL METHODS

26792, 27019, 27040, 27053, 27074, 27157

ELECTROCONDUCTIVITY ANALYZERS

27069, 27077, 27089

ELECTROLYSIS

26822, 26834, 26848, 27003, 27004

ELECTRON MICROSCOPY

26802

ELECTROSTATIC COUNTERS

27018

ELECTROSTATIC PRECIPITATORS

26799, 26800, 26808, 26854, 26863, 26864,
26877, 26892, 26894, 26898, 26902, 26907,
26909, 26917, 26918, 26921, 26923, 26932,
26933, 26950, 26952, 26956, 26958, 26959,
26968, 26983, 26999, 27005, 27007

EMISSION STANDARDS

26784, 26886, 26895, 26907, 26909, 26915,
26935, 26938, 26940, 26943, 26972, 26996,
27000, 27001, 27002, 27029, 27071, 27086,
27198, 27259, 27258, 27260, 27261, 27262,
27263, 27264, 27265, 27269, 27270, 27271,
27276, 27277, 27279, 27281, 27285, 27286

EMPHYSEMA

27021, 27201

ENFORCEMENT PROCEDURES

27272, 27288, 27289

SUBJECT INDEX

ENGINE DESIGN MODIFICATION

26776, 26777, 26779, 26784, 26787, 26809,
26817, 26818, 26774, 26827, 26828, 26829,
26832, 26879, 26885, 26886, 26915, 26922,
26943, 26960, 27000, 27002

ENGINE OPERATING CYCLES

26779, 26795, 26811, 26813, 26817, 26824,
26839, 26843, 26884, 26885, 26896, 26915,
26943, 26955, 26967, 26970, 27002, 27071,
27259, 27264, 27289

ENGINE OPERATION MODIFICATION

26777, 26797, 26804, 26811, 26812, 26817,
26818, 26839, 26840, 26843, 26879, 26884,
26885, 26886, 26896, 26899, 26912, 26915,
26922, 26845, 26846, 26955, 26960, 26967,
26998, 27000, 27002, 27152, 27181, 27262

ENGINEERS

27274

ENZYMES

26887, 27189, 27190, 27195, 27201, 27206,
27208, 27210, 27241, 27242

EPIDEMIOLOGY

27180, 27183, 27188, 27211, 27212, 27218

EQUIPMENT CRITERIA

27069, 27264, 27265

EQUIPMENT STANDARDS

27020, 27069, 27082, 27260, 27265

ESTERS

26767, 26905, 26988

ETHERS

26988

ETHYL ALCOHOL

27189

ETHYLENE

26930, 27038, 27150, 27162, 27166, 27253

EUROPE

26767, 26777, 26778, 26782, 26784, 26786,
26788, 26789, 26790, 26791, 26793, 26795,
26797, 26798, 26800, 26801, 26806, 26808,
26809, 26770, 26814, 26817, 26771, 26773,
26820, 26825, 26775, 26830, 26831, 26833,
26836, 26838, 26839, 26853, 26856, 26860,
26862, 26863, 26864, 26877, 26878, 26883,
26886, 26889, 26894, 26896, 26897, 26899,
26900, 26903, 26914, 26915, 26917, 26919,
26920, 26922, 26923, 26932, 26934, 26936,
26939, 26947, 26950, 26957, 26970, 26977,
26981, 26847, 26848, 26983, 26985, 26992,
26999, 27002, 27003, 27005, 27006, 27007,
27017, 27019, 27024, 27025, 27026, 27011,
27012, 27032, 27038, 27040, 27041, 27042,
27014, 27049, 27015, 27050, 27055, 27064,
27068, 27070, 27080, 27083, 27091, 27098,
27101, 27107, 27108, 27109, 27118, 27121,
27122, 27137, 27152, 27154, 27156, 27157,
27150, 27163, 27164, 27167, 27169, 27170,
27172, 27174, 27183, 27185, 27186, 27187,
27191, 27195, 27196, 27197, 27198, 27200,
27201, 27203, 27179, 27205, 27209, 27211,
27213, 27214, 27215, 27223, 27226, 27229,
27240, 27243, 27244, 27245, 27247, 27250,
27261, 27263, 27269, 27266, 27276, 27278,
27281, 27284, 27285, 27289, 27290, 27293

EVAPORATORS

26946

EXCESS AIR

26814, 26899, 26918, 26927

EXHAUST SYSTEMS

26793, 26851, 26859, 26863, 26864, 26865,
26914, 26924, 26968, 26997, 26999, 27103

EXPERIMENTAL EQUIPMENT

26794, 27018, 27042, 27053, 27057, 27058,
27060, 27065, 27068, 27077, 27157, 27159,
27209

EXPERIMENTAL METHODS

26794, 26913, 27018, 27011, 27034, 27035,
27038, 27042, 27045, 27046, 27053, 27056,
27061, 27063, 27064, 27067, 27073, 27082,
27117, 27155, 27157, 27161, 27175, 27233

EXPLOSIONS

26871

EXPOSURE CHAMBERS

27214, 27224, 27236, 27238

EXPOSURE METHODS

26903, 27182, 27186, 27190, 27194, 27196,
27201, 27179, 27208, 27214, 27220, 27223,
27224, 27239, 27236, 27237, 27238, 27241

EYE IRRITATION

27212

F

FADING

27244

FALLOUT

27119

FANS (BLOWERS)

26859, 26863, 26864, 26914, 26968, 26999

FEASIBILITY STUDIES

26815, 26828, 26843

FEDERAL GOVERNMENTS

26996, 27071, 27253, 27262, 27264, 27271,
27285, 27287, 27288, 27292

FEED LOTS

26982

FEEES

27265

FERROALLOYS

26848

FERTILIZER MANUFACTURING

26976, 26977, 27095, 27271

FIELD TESTS

26874, 26890, 26910, 27035, 27051, 27054,
27078, 27209

FILTER FABRICS

26859, 26869, 26897, 26898, 26900, 26918,
26947, 26968, 26991, 26999, 27018, 27061,
27062, 27068, 27078, 27079, 27081

FILTERS

26800, 26801, 26821, 26834, 26859, 26860,
26864, 26865, 26866, 26869, 26896, 26897,
26898, 26900, 26914, 26918, 26929, 26932,
26947, 26965, 26968, 26849, 26990, 26991,
26993, 26997, 26999, 27003, 27008, 27009,
27018, 27021, 27053, 27061, 27062, 27068,
27076, 27078, 27079, 27081, 27099

FIRING METHODS

26793, 26799, 26809, 26812, 26814, 26774,
26841, 26850, 26899, 26918, 26927, 26931,
26933, 26846, 26971, 27000, 27152, 27265

FLAME AFTERBURNERS

26769, 26840, 26862, 26867, 26934, 26960,
27262

FLAME IONIZATION DETECTOR

27018, 27027, 27040, 27041, 27061, 27069,
27071, 27094, 27117, 27262

FLARES

26887, 26916, 26930

FLOWERS

27220, 27231

FLOWMETERS

27013

FUEL OILS

FLUID FLOW

26859, 26875, 26883, 26888, 26919, 26931,
26947, 26965, 26971, 26994, 27003, 27011,
27013, 27034, 27039, 27046, 27059, 27060,
27061, 27062, 27070, 27072, 27075, 27096,
27152, 27163, 27172, 27197

FLUORANTHENES

27041

FLUORENES

27041

FLUORESCENCE

27018, 27031, 27052, 27081, 27157, 27166

FLUORIDES

26984, 27018, 27069, 27180, 27188, 27211,
27271

FLUORINATED HYDROCARBONS

27193

FLUORINE

26836, 26848, 27003, 27069, 27221

FLUORINE COMPOUNDS

26984, 27018, 27069, 27095, 27180, 27188,
27216, 27217, 27221, 27231, 27271, 27276

FLUOROSIS

27210, 27217, 27219

FLY ASH

26804, 26841, 26854, 26894, 26902, 26907,
26923, 26976, 26977, 26999, 27007, 27169

FOG

27108, 27123, 27136

FOOD AND FEED OPERATIONS

26826, 26854, 26951, 26966, 26982, 27004,
27037, 27240

FOODS

27004, 27211, 27240

FORMALDEHYDES

26797, 26840, 27056, 27061, 27115

FRANCE

26795, 26800, 26896, 26915, 27038, 27040,
27109

FREE RADICALS

27173

FRUITS

27224

FUEL ADDITIVES

26777, 26804, 26835, 26890, 26910, 26912,
26913, 26938, 26943, 26955, 27076, 27262,
27270

FUEL CHARGING

26846, 27000, 27152

FUEL EVAPORATION

26833, 27262

FUEL GASES

26781, 26783, 26789, 26791, 26799, 26804,
26808, 26770, 26812, 26814, 26773, 26823,
26825, 26775, 26830, 26870, 26872, 26844,
26920, 26933, 26944, 26846, 26950, 26951,
26957, 26980, 26987, 26995, 26997, 27174,
27254, 27255, 27259

FUEL OIL PREPARATION

26781, 26785, 26799, 26823, 26854, 26857,
26887, 26893, 26917, 26844, 26920, 26928,
26933, 26935, 26957, 26980, 26989, 26995,
27255

FUEL OILS

26785, 26789, 26799, 26800, 26804, 26808,
26812, 26814, 26856, 26857, 26867, 26872,
26891, 26893, 26896, 26913, 26844, 26920,
26928, 26933, 26938, 26846, 26951, 26957,

FUEL STANDARDS

- 26958, 26959, 26980, 26989, 26995, 27001, 27088, 27152, 27157, 27165, 27254, 27256
- FUEL STANDARDS**
26835, 26938, 27254, 27270, 27273, 27276, 27279
- FUMES**
26820, 26851, 26865, 26953, 26976, 26983, 27284
- FUNGI**
27239
- FURNACES**
26780, 26786, 26789, 26769, 26812, 26830, 26850, 26855, 26857, 26862, 26865, 26866, 26867, 26868, 26877, 26881, 26888, 26921, 26928, 26934, 26937, 26942, 26946, 26950, 26973, 26976, 26847, 27001, 27003, 27026, 27152, 27175, 27209, 27266, 27271, 27284

G

- GAMMA RADIATION**
27025, 27144, 27155
- GAS CHROMATOGRAPHY**
26792, 26941, 27018, 27026, 27027, 27038, 27040, 27041, 27055, 27061, 27063, 27067, 27069, 27071, 27073, 27078, 27084, 27117, 27131, 27262
- GAS SAMPLING**
27030, 27048, 27049, 27059, 27062, 27069, 27071, 27076
- GAS TURBINES**
26776, 26784, 26814, 26827, 26829, 26837, 26843, 26893
- GASIFICATION (SYNTHESIS)**
26781, 26823, 26837, 26857, 26870, 26844, 26920, 26945, 26987, 27252
- GASOLINES**
26777, 26787, 26797, 26802, 26824, 26835, 26840, 26890, 26896, 26901, 26910, 26913, 26916, 26845, 26938, 26943, 26955, 26956, 26967, 26969, 27001, 27076, 27132, 27152, 27157, 27254, 27255, 27259, 27270, 27276
- GENETICS**
27190
- GEORGIA**
2721
- GERMANY**
26767, 26778, 26782, 26790, 26798, 26801, 26808, 26814, 26817, 26771, 26839, 26878, 26883, 26889, 26899, 26900, 26903, 26917, 26922, 26923, 26934, 26939, 26970, 26981, 26847, 26848, 26983, 26992, 27002, 27003, 27005, 27006, 27017, 27011, 27012, 27032, 27041, 27042, 27049, 27015, 27070, 27080, 27098, 27118, 27121, 27122, 27156, 27150, 27163, 27195, 27197, 27198, 27203, 27205, 27209, 27211, 27223, 27226, 27240, 27266, 27276, 27278, 27281
- GLADIOLI**
27231
- GLASS**
26961, 26962, 26963, 26964
- GLASS FABRICS**
26859, 26869, 26947, 26991, 27018, 27061, 27062, 27078, 27079
- GRANTS**
26844, 26995
- GRAVITY SETTLING**
26898

SI-6

AIR POLLUTION ABSTRACTS, MAY 1973

- GREAT BRITAIN**
26784, 26786, 26789, 26793, 26806, 26809, 26773, 26820, 26825, 26775, 26853, 26856, 26860, 26862, 26864, 26886, 26894, 26897, 26914, 26919, 26920, 26936, 26947, 26999, 27024, 27050, 27101, 27137, 27152, 27157, 27170, 27187, 27196, 27200, 27243, 27244, 27250, 27269, 27284, 27285, 27290, 27293
- GROUND LEVEL**
27050, 27091, 27108, 27110, 27119, 27130, 27135, 27148, 27139, 27105, 27141, 27285
- GUINEA PIGS**
27186, 27201
- H**
- HALOGEN GASES**
26792, 26836, 26965, 26848, 27003, 27051, 27069, 27100, 27131, 27221, 27219
- HALOGENATED HYDROCARBONS**
26929, 27040, 27063, 27078, 27193, 27253, 27258, 27283
- HAZE**
26767
- HEADACHE**
27182
- HEALTH IMPAIRMENT**
27192, 27200, 27212, 27292
- HEALTH STATISTICS**
27188
- HEART**
27203, 27204, 27214, 27217
- HEAT CAPACITY**
26845, 27119
- HEAT OF COMBUSTION**
26769, 26841
- HEAT TRANSFER**
26782, 26795, 26772, 26834, 26841, 26854, 26862, 26866, 26874, 26878, 26882, 26883, 26893, 26918, 26942, 26966, 26985, 26849, 26998, 27000, 27063, 27119
- HEIGHT FINDING**
27110, 27127, 27105, 27147, 27284
- HEMATOLOGY**
26903, 27101, 27181, 27182, 27186, 27187, 27195, 27201, 27202, 27179, 27210, 27218, 27240
- HEMOGLOBIN INTERACTIONS**
27179
- HEXANES**
27040, 27078
- HI-VOL SAMPLERS**
26803, 27018, 27021, 27047, 27060, 27063, 27078, 27081, 27088, 27093, 27102, 27153
- HIGHWAYS**
26790, 27101, 27146, 27185, 27225
- HUMIDITY**
26812, 26874, 26929, 26845, 26959, 26965, 26968, 26993, 27091, 27103, 27112, 27122, 27123, 27128, 27130, 27134, 27148, 27141, 27160, 27164, 27174, 27178, 27225, 27226, 27239, 27245, 27250
- HYDRAZINES**
26804
- HYDRIDES**
26822, 27073
- HYDROCHLORIC ACID**
26778, 26981, 26983, 27059, 27069
- HYDROCYANIC ACID**
26797, 26903
- HYDRODESULFURIZATION**
26823, 26920, 26928, 26957, 26989, 27255
- HYDROFLUORIC ACID**
26808, 26965, 26983, 26984, 27059, 27069, 27089, 27223, 27219
- HYDROGEN**
26768, 26791, 26801, 26804, 26811, 26822, 26893, 26921, 26989, 27026
- HYDROGEN SULFIDE**
26781, 26768, 26820, 26881, 26882, 26888, 26844, 26925, 26936, 26944, 26950, 26965, 27004, 27009, 27022, 27026, 27053, 27069, 27070, 27125, 27170, 27276
- HYDROGENATION**
26882, 26936, 27255
- HYDROSPHERE**
27118
- HYDROXIDES**
26906
- I**
- IMMUNOLOGY**
27201, 27218
- IMPINGERS**
26813, 26897, 27018, 27013, 27063, 27064
- INCINERATION**
26778, 26782, 26799, 26769, 26819, 26841, 26850, 26851, 26854, 26858, 26862, 26887, 26888, 26891, 26909, 26934, 26946, 26949, 26951, 26966, 26981, 26982, 27005, 27037, 27265, 27271, 27283, 27285
- INDOOR**
26990, 27092, 27099, 27103, 27104
- INDUSTRIAL AREAS**
26805, 26842, 27078, 27088, 27089, 27094, 27095, 27096, 27097, 27100, 27111, 27121, 27188, 27209, 27216, 27221, 27222, 27231, 27232, 27235, 27249, 27292
- INERTIAL SEPARATION**
26898, 27060, 27068
- INFECTIOUS DISEASES**
27201
- INFRARED RADIATION**
27123
- INFRARED SPECTROMETRY**
26824, 27040, 27052, 27069, 27071, 27084, 27098, 27149, 27151, 27262
- INHALATION THERAPY**
27181
- INHIBITION**
27189, 27201, 27208
- INORGANIC ACIDS**
26778, 26808, 26833, 26855, 26891, 26907, 26925, 26927, 26932, 26944, 26959, 26965, 26972, 26980, 26981, 26983, 26984, 26991, 27004, 27036, 27046, 27059, 27069, 27089, 27093, 27112, 27160, 27223, 27219, 27246, 27271
- INSPECTION**
26901, 27071, 27262, 27264, 27285, 27289
- INSPECTORS**
27267
- INSTRUMENTATION**
27033, 27039, 27052, 27053, 27209, 27264

SUBJECT INDEX

INTERMITTENT MONITORING

27026, 27015, 27070

INTERNAL COMBUSTION ENGINES

26776, 26779, 26787, 26790, 26795, 26797,
26804, 26809, 26811, 26770, 26817, 26771,
26822, 26774, 26827, 26829, 26830, 26832,
26836, 26879, 26884, 26885, 26886, 26896,
26910, 26915, 26943, 26955, 26970, 26998,
27000, 27264

INVERSION

27095, 27106, 27143

IODIDES

27013, 27045

IODIMETRIC METHODS

27018, 27021, 27013, 27035, 27040, 27070,
27074, 27083, 27113, 27146, 27238

IODINE COMPOUNDS

26801, 27013, 27045

IONIZATION

27166, 27173

IONS

27027, 27136, 27144, 27246

IRON

26786, 26789, 26805, 26826, 26851, 26854,
26862, 26864, 26865, 26868, 26921, 26939,
26975, 26976, 26979, 26995, 27088, 27188,
27209, 27245, 27248, 27249, 27269

IRON COMPOUNDS

26896, 26905, 26940, 26969, 27079, 27081,
27091, 27096, 27099, 27100, 27204, 27222,
27230, 27235

IRON OXIDES

26888, 26921, 27167

IRRADIATION CHAMBERS

27114, 27161, 27176, 27177, 27178

ISOTOPES

27054, 27079, 27139

J

JAPAN

26780, 26802, 26803, 26805, 26813, 26774,
26824, 26835, 26842, 26846, 26868, 26874,
26875, 26876, 26904, 26905, 26906, 26912,
26844, 26924, 26926, 26927, 26929, 26931,
26933, 26845, 26942, 26953, 26954, 26959,
26960, 26961, 26962, 26963, 26964, 26965,
26968, 26969, 26971, 26972, 26973, 26974,
26975, 26978, 26984, 26990, 26991, 26993,
26994, 26995, 26998, 27008, 27009, 27016,
27020, 27021, 27035, 27036, 27037, 27043,
27044, 27045, 27046, 27047, 27051, 27056,
27057, 27058, 27059, 27060, 27061, 27062,
27063, 27065, 27069, 27071, 27072, 27076,
27077, 27078, 27079, 27081, 27082, 27084,
27086, 27087, 27088, 27089, 27090, 27085,
27093, 27094, 27095, 27096, 27097, 27099,
27100, 27102, 27103, 27104, 27106, 27111,
27112, 27113, 27114, 27115, 27116, 27117,
27120, 27125, 27126, 27127, 27129, 27131,
27132, 27134, 27105, 27143, 27146, 27147,
27153, 27160, 27161, 27171, 27175, 27178,
27192, 27199, 27207, 27210, 27212, 27216,
27217, 27218, 27221, 27222, 27224, 27225,
27227, 27228, 27231, 27232, 27233, 27234,
27235, 27236, 27237, 27241, 27219, 27242,
27258, 27272, 27273, 27279, 27267, 27283,
27268, 27292

K

KANAGAWA PREFECTURE

27079, 27104, 27131, 27132, 27212, 27221,
27222, 27235

KENTUCKY

26940

KEROSENE

27152

KETONES

26767, 26988, 27253

KILNS

26789, 26857, 26863, 26876, 26889, 26927,
26972, 26975, 26981, 26984, 26997, 26999,
27269

KRAFT PULPING

26826, 26850, 26946, 26995, 27193

L

LABORATORY ANIMALS

26903, 27184, 27186, 27190, 27194, 27196,
27199, 27201, 27179, 27206, 27208, 27211,
27213, 27214

LAND USE

26808, 27101, 27148, 27291

LANDFILLS

26946

LASERS

27024, 27028, 27034, 27052, 27149

LAUNDERING (COAL)

26940

LEAD

26932, 26848, 27086

LEAD COMPOUNDS

26777, 26802, 26808, 26835, 26860, 26890,
26896, 26901, 26910, 26912, 26913, 26938,
26943, 26955, 26969, 27054, 27076, 27079,
27081, 27086, 27096, 27099, 27100, 27101,
27139, 27155, 27184, 27186, 27187, 27193,
27195, 27202, 27210, 27222, 27233, 27235,
27254, 27262, 27270, 27276

LEAD PEROXIDE CANDLE

26842, 27089, 27094, 27127

LEAVES

27221, 27222, 27230, 27231, 27232, 27233,
27234, 27238, 27219

LEGISLATION

26780, 26798, 26996, 27259, 27269, 27273,
27276, 27277, 27278, 27280, 27282, 27284,
27285, 27288, 27289, 27291

LETTUCE

27230

LEUKOCYTES

27190

LIDAR

27124

LIGHT SCATTERING

27023, 27034, 27108, 27123, 27124, 27133,
27138

LIME

26789, 26857, 26876, 26927, 26972, 26975,
26981

LIMESTONE

26855, 26888, 26907, 26921, 26928, 26980

LIPIDS

27196

LITHIUM COMPOUNDS

26906

LITIGATION

27266

MEETINGS

LIVER

27189, 27205

LOCAL GOVERNMENTS

27253, 27281, 27284, 27292

LOS ANGELES

27123

LOWER ATMOSPHERE

26818, 27113, 27114, 27118, 27129, 27134,
27148, 27139, 27140, 27141

LUBRICANTS

26912

LUNG CANCER

26805, 26821, 27180, 27185, 27188

LUNG CLEARANCE

27194, 27207, 27209

LUNGS

27021, 27184, 27190, 27196, 27197, 27201,
27204, 27206, 27208, 27209, 27217

M

MAGNESIUM COMPOUNDS

26876, 26906, 26980, 27091, 27099, 27167,
27204

MAGNETIC PROPERTIES

27028, 27149

MAGNETOHYDRODYNAMICS (MHD)

26918

MAINTENANCE

26793, 26796, 26820, 26837, 26839, 26865,
26871, 26892, 26926, 26959, 26965, 26991,
27007, 27008, 27016, 27110, 27264, 27289

MANAGEMENT PERSONNEL

26887, 27267

MANGANESE COMPOUNDS

26874, 26905, 26910, 27079, 27099, 27100,
27167, 27187, 27222, 27235

MANGANESE DIOXIDE (JAPANESE)

26995

MAPPING

27129

MARYLAND

26940

MASS SPECTROMETRY

27038, 27054

MASS TRANSPORTATION

26806, 26815

MATHEMATICAL ANALYSES

26795, 26812, 26838, 26897, 26910, 26954,
26959, 26971, 27024, 27011, 27034, 27075,
27079, 27122, 27123, 27133, 27136, 27137,
27138, 27141, 27146, 27152, 27156, 27159,
27162, 27163, 27165, 27173, 27197, 27203

MATHEMATICAL MODELING

26795, 26812, 27075, 27122, 27123, 27136,
27152

MAXIMUM ALLOWABLE CONCENTRATION

27085, 27110, 27191, 27261, 27263, 27279,
27285

MEDICAL FACILITIES

27226

MEDICAL PERSONNEL

27198

MEETINGS

26808

MEMBRANE FILTERS

MEMBRANE FILTERS

26887, 26897, 26947, 27017, 27018, 27051, 27059

MEMBRANES

27208

MERCAPTANS

27062, 27125, 27150

MERCURY

26834

MERCURY COMPOUNDS

26792, 26834, 26983, 27025, 27031, 27053, 27092, 27187, 27193

METABOLISM

27189, 27241

METAL COMPOUNDS

26777, 26792, 26802, 26808, 26819, 26822, 26830, 26834, 26835, 26860, 26863, 26870, 26874, 26876, 26890, 26891, 26896, 26901, 26905, 26906, 26910, 26912, 26913, 26929, 26936, 26938, 26940, 26943, 26944, 26948, 26955, 26965, 26969, 26980, 26983, 26984, 27006, 27025, 27031, 27033, 27046, 27051, 27053, 27054, 27059, 27073, 27076, 27079, 27081, 27086, 27091, 27092, 27096, 27099, 27100, 27101, 27111, 27139, 27144, 27154, 27155, 27167, 27151, 27184, 27186, 27187, 27193, 27195, 27202, 27204, 27210, 27216, 27217, 27222, 27230, 27232, 27233, 27235, 27242, 27243, 27247, 27254, 27256, 27262, 27270, 27276, 27283

METAL FABRICATING AND FINISHING

26786, 26810, 26826, 26830, 26851, 26862, 26865, 26924, 26932, 26975, 26976, 26848, 26995, 27003, 27005, 27095, 27209, 27232, 27233, 27285

METAL POISONING

27186, 27187

METALS

26786, 26789, 26805, 26826, 26834, 26851, 26854, 26862, 26864, 26865, 26868, 26921, 26924, 26929, 26932, 26936, 26939, 26975, 26976, 26979, 26848, 26983, 26995, 27003, 27053, 27086, 27088, 27095, 27156, 27171, 27151, 27188, 27209, 27232, 27233, 27243, 27245, 27248, 27249, 27269

METEOROLOGICAL INSTRUMENTS

27035, 27129

METEOROLOGY

26767, 26798, 26803, 26812, 26818, 26842, 26874, 26929, 26845, 26959, 26965, 26968, 26993, 27019, 27037, 27091, 27095, 27103, 27106, 27116, 27108, 27111, 27112, 27113, 27114, 27115, 27116, 27117, 27119, 27120, 27121, 27122, 27123, 27126, 27127, 27128, 27129, 27130, 27133, 27134, 27135, 27148, 27136, 27139, 27140, 27105, 27141, 27142, 27143, 27144, 27145, 27147, 27160, 27164, 27170, 27174, 27178, 27209, 27223, 27225, 27226, 27227, 27234, 27239, 27245, 27246, 27250, 27268

METHANES

26768, 26773, 26821, 26925, 27004, 27026, 27027, 27038, 27053, 27106, 27166, 27252

MICE

27213

MICROMETEOROLOGY

27106, 27107, 27115, 27119, 27129, 27227

MICROORGANISMS

26773, 26936, 27017, 27048, 27226, 27239

MICROSCOPY

27024, 27012, 27171

MIDDLE ATMOSPHERE

26818, 27140

AIR POLLUTION ABSTRACTS, MAY 1973

MILK

27004, 27240

MINERAL PROCESSING

26793, 26803, 26852, 26853, 26859, 26863, 26864, 26870, 26871, 26878, 26889, 26997, 26999, 27005, 27070, 27209, 27269, 27266, 27271, 27285

MINING

26793, 26852, 26870, 26871, 27266, 27271

MISTS

26858, 26896, 26849, 27012, 27063, 27112, 27160

MONITORING

26800, 26851, 26901, 27016, 27019, 27022, 27026, 27028, 27029, 27039, 27014, 27015, 27052, 27057, 27065, 27069, 27070, 27072, 27074, 27077, 27084, 27086, 27089, 27101, 27120, 27121, 27145, 27169

MONTHLY

27086, 27087, 27095, 27100, 27126, 27127, 27222, 27227, 27228, 27235, 27245

MORBIDITY

26805, 27192, 27196

MORTALITY

26803, 27181, 27185, 27188, 27199

MOTTILING

27224

MOUNTAINS

27134, 27225

N

NASHVILLE

26841

NATURAL GAS

26781, 26783, 26770, 26812, 26814, 26823, 26825, 26775, 26872, 26920, 26933, 26944, 26951, 26980, 26987, 26995, 26997, 27174, 27254, 27255

NERVOUS SYSTEM

27182, 27187, 27203, 27214

NETHERLANDS

26770, 26863

NEUTRON ACTIVATION ANALYSIS

26792, 27051, 27144

NEW YORK CITY

26815, 27265

NEW YORK STATE

26815, 27265

NICKEL

26936

NICKEL COMPOUNDS

26830, 26905, 26936, 26948, 27079, 27099, 27184, 27193, 27230, 27235

NITRATES

26896, 26905, 27099, 27100, 27146, 27170, 27211, 27219

NITRIC ACID

27046, 27093, 27271

NITRIC ANHYDRIDE (N2O5)

27112

NITRIC OXIDE (NO)

26812, 26839, 26886, 26906, 26845, 26941, 26950, 26994, 27027, 27028, 27035, 27040, 27043, 27056, 27057, 27058, 27065, 27067, 27082, 27098, 27106, 27112, 27114, 27146, 27149, 27161, 27173, 27151, 27176, 27178, 27224

NITRILES

27027

NITRITES

27211

NITROGEN

26477, 27006, 27026, 27027, 27067, 27154, 27149, 27158, 27166

NITROGEN DIOXIDE (NO2)

26839, 26906, 26845, 26941, 26994, 27018, 27021, 27035, 27045, 27056, 27065, 27082, 27098, 27106, 27112, 27114, 27115, 27146, 27161, 27166, 27170, 27178, 27194, 27205, 27206, 27208, 27224, 27225

NITROGEN OXIDES

26776, 26779, 26784, 26787, 26797, 26799, 26809, 26812, 26817, 26818, 26822, 26774, 26827, 26828, 26836, 26837, 26839, 26867, 26868, 26883, 26884, 26885, 26886, 26899, 26905, 26906, 26907, 26912, 26913, 26915, 26918, 26922, 26923, 26927, 26933, 26945, 26944, 26941, 26943, 26948, 26950, 26960, 26967, 26977, 26994, 27000, 27001, 27018, 27021, 27027, 27028, 27035, 27038, 27040, 27043, 27045, 27056, 27057, 27058, 27065, 27067, 27071, 27082, 27084, 27087, 27089, 27098, 27106, 27112, 27114, 27115, 27119, 27131, 27132, 27142, 27146, 27149, 27161, 27166, 27170, 27173, 27151, 27176, 27178, 27194, 27201, 27205, 27206, 27208, 27218, 27224, 27225, 27244, 27255, 27259, 27262, 27264, 27276

NITROSO

27211

NITROUS OXIDE (N2O)

27027, 27038, 27166

NON-URBAN AREAS

27249

NUCLEAR POWER PLANTS

26800, 26801, 26917, 27254

NUCLEATION

27136, 27137, 27160

O

OCEANS

27118, 27249

OCTANES

26787, 26835, 26890, 26910, 26938, 26943, 26955, 26967

ODOR COUNTERACTION

26769, 26819, 26826, 26854, 26946, 26951, 26966, 26982, 26849, 27004, 27037

ODORIMETRY

27033, 27037, 27044, 27080

ODORS

26797, 26799, 26820, 26826, 26836, 26854, 26859, 26887, 26888, 26895, 26946, 26951, 26966, 26982, 26849, 27004, 27033, 27037, 27044, 27062, 27069, 27080, 27125, 27150, 27284

OHIO

27148

OIL BURNERS

26857, 26928, 26973, 27001

OIL RESOURCES

26785, 26804, 26938, 27165, 27254

OLEFINS

26930, 26988, 27038, 27131, 27150, 27162, 27166, 27253

SUBJECT INDEX

OPEN BURNING
26794, 26816

OPEN HEARTH FURNACES
26830, 26877

OPERATING CRITERIA
27069, 27082, 27260, 27264, 27265

OPERATING VARIABLES
26776, 26779, 26781, 26784, 26787, 26788,
26791, 26794, 26796, 26797, 26810, 26811,
26814, 26817, 26771, 26820, 26774, 26823,
26825, 26828, 26829, 26832, 26837, 26839,
26843, 26857, 26858, 26874, 26876, 26878,
26880, 26881, 26882, 26884, 26885, 26890,
26891, 26892, 26896, 26902, 26906, 26910,
26914, 26918, 26919, 26920, 26927, 26930,
26931, 26845, 26938, 26939, 26942, 26943,
26944, 26846, 26945, 26948, 26952, 26954,
26955, 26956, 26957, 26958, 26959, 26961,
26962, 26963, 26964, 26965, 26966, 26967,
26968, 26971, 26973, 26974, 26975, 26976,
26987, 26849, 26989, 26991, 26993, 27000,
27003, 27005, 27006, 27007, 27023, 27011,
27028, 27032, 27013, 27034, 27039, 27050,
27056, 27057, 27058, 27059, 27060, 27061,
27062, 27063, 27067, 27068, 27070, 27075,
27077, 27103, 27110, 27152, 27157, 27159,
27160, 27163, 27256, 27252

OPINION SURVEYS
27278, 27292

ORGANIC ACIDS
26767, 26797, 26819, 26903, 27001, 27061,
27220, 27229

ORGANIC DISEASES
27204

ORGANIC NITROGEN COMPOUNDS
27046, 27062, 27173, 27179, 27205, 27211

ORGANIC SULFUR COMPOUNDS
27062, 27069, 27125, 27150

ORGANIC WASTES
26858

OSAKA
27051, 27088, 27093, 27102, 27112, 27116,
27131, 27199, 27272, 27279

OVERFIRE AIR
26841, 27265

OXIDANTS
26840, 27018, 27021, 27035, 27074, 27087,
27089, 27112, 27113, 27114, 27120, 27129,
27131, 27132, 27143, 27146, 27153, 27160,
27178

OXIDATION
26867, 26882, 26920, 26922, 26845, 26940,
26969, 26982, 27125, 27136, 27170, 27177,
27243

OXYGEN
26789, 26811, 26812, 26921, 26845, 27006,
27026, 27125, 27149, 27158, 27160, 27161,
27166, 27177, 27186

OXYGEN LANCING
27013

OXYGENATED FRACTIONS
26840

OZONE
26797, 26818, 27018, 27013, 27040, 27043,
27056, 27065, 27074, 27112, 27114, 27125,
27131, 27132, 27138, 27142, 27146, 27153,
27158, 27161, 27150, 27162, 27170, 27177,
27190, 27200, 27208, 27220, 27238, 27241,
27219, 27244

P

PACKED TOWERS
26850, 26847, 26984, 27010

PAINT MANUFACTURING
26769, 26988, 26986

PAINTS
26988, 26986, 26988, 27092, 27251

PAPER MANUFACTURING
26850, 26854, 26888, 26946, 26995

PARAMETRIA
27199

PARTICLE COUNTERS
27018, 27023, 27015, 27068, 27153, 27239

PARTICLE GROWTH
26898, 26959, 27119, 27136

PARTICLE SHAPE
26882, 26821, 27159

PARTICLE SIZE
26798, 26802, 26821, 26896, 26977, 26982,
26957, 26968, 26971, 27028, 27021, 27023,
27024, 27011, 27012, 27029, 27032, 27034,
27047, 27015, 27068, 27075, 27076, 27091,
27096, 27102, 27104, 27108, 27111, 27118,
27122, 27123, 27124, 27130, 27133, 27137,
27152, 27153, 27159, 27160, 27164, 27172,
27197

PARTICULATE SAMPLING
26896, 27020, 27030, 27039, 27047, 27048,
27059

PATHOLOGICAL TECHNIQUES
27184, 27203, 27214

PENNSYLVANIA
26940, 27001

PERMEABILITY
26897, 26980, 26947, 27061, 27078

PERMITS
27265, 27277, 27289

PEROXIDES
27146

PEROXYACETYL NITRATE
27146, 27219

PEROXYACYL NITRATES
27146, 27219

PERSONNEL
26887, 27198, 27274, 27275, 27280, 27267,
27288, 27291

PERSONNEL QUALIFICATIONS
27274, 27275, 27267

PERYLENES
26830, 27041, 27199

PESTICIDES
27189, 27193, 27271

PETER SPENCE PROCESS (CLAUS)
26781, 26854, 26873, 26880, 26881, 26882,
26891, 26925, 26944, 27022

PETROLEUM DISTRIBUTION
26901

PETROLEUM PRODUCTION
26901

PETROLEUM REFINING
26785, 26796, 26799, 26804, 26819, 26826,
26854, 26868, 26887, 26891, 26893, 26916,
26920, 26930, 26952, 26956, 26958, 26989,
26995, 27001, 27030, 27088, 27255, 27260,
27270

POINT SOURCES

PETUNIAS
27220

PH
26972, 26975, 27013, 27125, 27186, 27246

PHENANTHRENES
27041

PHENOLS
26856, 26977

PHENYL COMPOUNDS
27078, 27162, 27283

PHILADELPHIA
27001

PHOSPHINE
27027

PHOSPHORUS COMPOUNDS
26913, 26921, 27027, 27167, 27270

PHOTOCHEMICAL REACTIONS
26812, 26818, 26840, 26938, 26988, 27112,
27113, 27114, 27115, 27120, 27125, 27131,
27132, 27134, 27143, 27146, 27153, 27158,
27160, 27161, 27173, 27176, 27178, 27192,
27234

PHOTOELECTRIC PHENOMENA
27158, 27166

PHOTOGRAPHIC METHODS
26771, 26959, 27024

PHOTONIZATION
27166

PHOTOLYSIS
27158, 27173

PHOTOMETRIC METHODS
27016, 27018, 27022, 27023, 27024, 27012,
27013, 27040, 27046, 27014, 27064, 27066,
27069, 27083, 27084, 27089, 27156, 27238

PHOTOXIDATION
27125, 27160, 27178

PHOTOSYNTHESIS
27223, 27237, 27242

PHYTOTOXICANTS
27223, 27230

PILOT PLANTS
26785, 26812, 26833, 26855, 26861, 26881,
26944, 26975, 26989, 27174

PINTO BEANS
27241

PLANNING AND ZONING
26808, 27101, 27121, 27135, 27148, 27261,
27263, 27289, 27291

PLANT DAMAGE
26984, 27095, 27115, 27188, 27220, 27223,
27224, 27225, 27227, 27228, 27231, 27234,
27236, 27237, 27219, 27242

PLANT GROWTH
27220, 27223, 27224, 27227, 27230, 27231,
27233, 27236, 27237, 27242

PLANT INDICATORS
27239, 27219

PLASTICS
26778, 26903

PLATINUM
27151

PLUME BEHAVIOR
27050, 27105

POINT SOURCES
27261

POLYNUCLEAR COMPOUNDS

POLYNUCLEAR COMPOUNDS
26830, 26938, 27018, 27041, 27093, 27199

POTASSIUM COMPOUNDS
26863, 26870, 26906, 27013, 27099

POTATOES
27227

POTENTIOMETRIC METHODS
27019, 27157

POWER SOURCES
26776, 26779, 26784, 26787, 26768, 26790,
26795, 26797, 26804, 26807, 26809, 26811,
26770, 26814, 26817, 26771, 26772, 26773,
26822, 26774, 26827, 26828, 26829, 26830,
26832, 26836, 26837, 26843, 26879, 26884,
26885, 26886, 26893, 26896, 26910, 26915,
26943, 26955, 26970, 26998, 27000, 27264,
27291

PRECIPITATION
27119, 27128, 27134, 27136, 27139, 27144,
27239, 27246, 27250

PRESSURE (ATMOSPHERIC)
27120, 27134

PRIMARY METALLURGICAL PROCESSING
26789, 26805, 26826, 26854, 26864, 26865,
26868, 26877, 26919, 26921, 26924, 26939,
26976, 26983, 26995, 27088, 27111, 27188,
27209, 27269, 27285, 27287

PRINTING
26949

PROCESS MODIFICATION
26786, 26788, 26793, 26799, 26800, 26801,
26809, 26812, 26814, 26774, 26825, 26831,
26837, 26841, 26850, 26851, 26853, 26857,
26858, 26868, 26873, 26878, 26887, 26895,
26899, 26911, 26918, 26919, 26920, 26921,
26927, 26930, 26931, 26933, 26937, 26846,
26945, 26949, 26952, 26956, 26966, 26971,
26988, 27000, 27001, 27110, 27152, 27253,
27265, 27266, 27293

PROPANES
26789, 27117

PROPENES
27131

PROPIONALDEHYDES
27056

PROPOSALS
26809, 27276

PROTEINS
27195, 27201

PUBLIC AFFAIRS
27097, 27193, 27274, 27278, 27292

PUBLIC INFORMATION
27274, 27292

PULMONARY EDEMA
27021

PYRENES
26830, 26938, 27018, 27041, 27093, 27199

PYRIDINES
27046

PYROLYSIS
26791, 26794, 27073

Q

QUARTZ
26991, 27123, 27196, 27209

QUENCHING
26831, 26919

SI-10

QUESTIONNAIRES
27192, 27212, 27292

R

RABBITS
27208

RADIATION COUNTERS
27155

RADIATION MEASURING SYSTEMS
27025, 27014, 27139, 27155, 27209

RADIOACTIVE RADIATION
26801, 27025, 27031, 27014, 27079, 27081,
27119, 27139, 27144, 27155, 27157, 27209,
27289

RADIOACTIVE TRACERS
27139, 27209

RAIN
27128, 27134, 27136, 27239, 27246, 27250

RAPPING
26959, 27007

RATS
26901, 27184, 27190, 27194, 27196, 27179,
27206, 27211, 27213, 27214

REACTION KINETICS
26812, 27136, 27158, 27150, 27162, 27170,
27173, 27177

REACTION MECHANISMS
26792, 26812, 27006, 27027, 27136, 27154,
27156, 27158, 27162, 27170, 27173, 27151,
27177, 27233

RECOMBINATION
26969

RECORDING METHODS
26771, 26959, 27024, 27072

REDUCTION
26873, 26906, 26925, 27151

REFRACTIVE INDEX
27023, 27122, 27123, 27124, 27133

REGIONAL GOVERNMENTS
27292

REGULATIONS
26818, 26835, 26911, 26933, 26937, 26992,
27000, 27029, 27087, 27253, 27254, 27257,
27265, 27269, 27270, 27273, 27276, 27278,
27279, 27267, 27284, 27285, 27287, 27288,
27289

RENDERING
26982

REPRODUCTION
27185, 27189

RESEARCH METHODOLOGIES
26886, 27033, 27193, 27248, 27268

RESEARCH PROGRAMS
26870, 26879, 26912, 26844, 27251, 27271,
27276, 27268

RESIDENTIAL AREAS
27096, 27106, 27114, 27121, 27221, 27222,
27235

RESIDUAL OILS
26872, 26891, 26844, 26920, 26995, 27001,
27157, 27165, 27254, 27256

RESPIRATION
27238

AIR POLLUTION ABSTRACTS, MAY 1973

RESPIRATORY DISEASES
26805, 27021, 27190, 27201, 27204, 27212,
27216, 27217, 27218

RESPIRATORY SYSTEM
27021, 27184, 27190, 27194, 27196, 27197,
27201, 27204, 27206, 27208, 27209, 27217,
27218

RETENTION
27191, 27204, 27209, 27221, 27222, 27223,
27229, 27231, 27232, 27233, 27235, 27238

RINGELMANN CHART
26952, 27016, 27029, 27050, 27066

RIVERS
27126

ROTARY PISTON ENGINES
26832, 26943

RUBBER MANUFACTURING
26995

S

SALARIES
27291

SALTZMAN METHOD
27021, 27040, 27058, 27082, 27146

SAMPLERS
26802, 26803, 26813, 26887, 26897, 26947,
26971, 27017, 27018, 27020, 27021, 27012,
27013, 27047, 27051, 27059, 27060, 27062,
27063, 27064, 27068, 27071, 27077, 27078,
27079, 27081, 27088, 27093, 27096, 27102,
27104, 27153

SAMPLING PROBES
27039

SANITARIANS
27198

SCANDINAVIA
27014, 27154

SCATTERING (ATMOSPHERIC)
27108, 27122, 27123, 27124, 27133, 27138,
27141

SCRUBBERS
26819, 26841, 26850, 26851, 26852, 26854,
26858, 26870, 26871, 26873, 26878, 26883,
26887, 26888, 26898, 26909, 26921, 26927,
26928, 26932, 26934, 26950, 26951, 26953,
26954, 26968, 26972, 26973, 26974, 26975,
26976, 26978, 26980, 26981, 26847, 26982,
26983, 26984, 26985, 26995, 26999, 27004,
27010, 27037, 27042, 27265

SEA BREEZE
26842, 27095, 27112, 27114, 27134, 27143

SEA SALTS
26808, 27118, 27122, 27247, 27249, 27250

SEALING COMPOUNDS
26996

SECONDARY AIR
26793, 26809, 26899, 26931, 26971

SEDIMENTATION
26898, 27060, 27068

SELENIUM COMPOUNDS
27051

SETTLING CHAMBERS
26898, 26968, 26977

SUBJECT INDEX

SETTLING PARTICLES

26780, 26768, 26791, 26793, 26798, 26800,
26802, 26803, 26805, 26808, 26810, 26820,
26821, 26836, 26852, 26853, 26863, 26864,
26865, 26866, 26869, 26871, 26877, 26878,
26900, 26914, 26916, 26919, 26923, 26924,
26931, 26939, 26947, 26953, 26959, 26968,
26971, 26974, 26976, 26977, 26847, 26848,
26983, 26997, 26999, 27001, 27005, 27016,
27021, 27011, 27029, 27036, 27040, 27047,
27051, 27068, 27070, 27081, 27087, 27088,
27099, 27104, 27110, 27112, 27118, 27122,
27128, 27130, 27140, 27152, 27168, 27188,
27221, 27226, 27233, 27235, 27247, 27249,
27250, 27269, 27276, 27284

SEWAGE

26773, 26826, 26850, 26888, 26891, 26926,
26946, 27004, 27285

SEWAGE TREATMENT

26826, 26926

SHIPS

26783, 26806, 26775

SIEVE ANALYSIS

27015

SILICATES

26941

SILICON COMPOUNDS

26786, 26869, 26941, 27091

SILICON DIOXIDE

27167, 27188, 27198

SILVER COMPOUNDS

27144

SILVER IODIDE

27144

SIMULATION

26794, 26795, 26811, 26902, 27116, 27117,
27148, 27105, 27268

SINTERING

26864, 26868, 26877, 26919

SKIN

26805

SLUDGE

26850, 26888, 26891, 26946, 27285

SMOG

26812, 27002, 27095, 27112, 27114, 27123,
27131, 27132, 27134, 27143, 27146, 27153,
27192, 27234

SMOKE SHADE

26952, 27016, 27029, 27040, 27050, 27066,
27104, 27141

SMOKEMETERS

27016, 27029, 27040, 27014, 27066, 27141

SMOKES

26793, 26810, 26818, 26820, 26856, 26875,
26916, 26972, 26976, 26995, 27029, 27050,
27110, 27137, 27269, 27271

SMOKING

27185, 27189, 27207

SNOW

27246

SOCIAL ATTITUDES

26807, 27292

SOCIO-ECONOMIC FACTORS

26783, 26806, 26815, 26909, 26911, 26944,
27254, 27255, 27282, 27283, 27289, 27291

SODIUM CARBONATE

26965, 27059

SODIUM CHLORIDE

26834, 27247

SODIUM COMPOUNDS

26819, 26834, 26876, 26891, 26906, 26944,
26965, 26984, 27046, 27059, 27099, 27167,
27242, 27247, 27256

SODIUM HYDROXIDE

26834, 26965, 26984, 27046

SODIUM SULFITE

26876, 26891, 26944, 27242

SOILING INDEX

27137, 27141

SOILS

27111, 27155, 27188, 27221, 27230, 27232,
27246, 27249, 27283

SOLAR RADIATION

26807, 26773, 27066, 27107, 27115, 27120,
27132, 27134, 27141, 27142, 27161, 27176,
27223

SOLID WASTE DISPOSAL

26778, 26793, 26816, 26773, 26841, 26850,
26852, 26854, 26858, 26887, 26888, 26934,
26946, 26951, 26977, 27265, 27271, 27283,
27291

SOLVENT REFINING (LOW ASH)

26861, 26870, 26940

SOLVENTS

26908, 26911, 26914, 26949, 26986, 26988,
26996, 27063, 27253

SOOT

26780, 26869, 26977, 27249

SOURCE SAMPLING

26909, 26997, 27016, 27022, 27029, 27030,
27036, 27039, 27014, 27072

SO2 REMOVAL (COMBUSTION PRODUCTS)

26781, 26799, 26800, 26804, 26854, 26855,
26857, 26870, 26873, 26876, 26880, 26881,
26882, 26887, 26888, 26891, 26907, 26917,
26918, 26921, 26923, 26925, 26927, 26928,
26932, 26933, 26935, 26944, 26965, 26972,
26973, 26974, 26975, 26976, 26977, 26980,
26848, 26983, 26984, 26995, 27006, 27022,
27036, 27037, 27088, 27154, 27149, 27256,
27257

SPARK IGNITION ENGINES

26779, 26787, 26790, 26795, 26797, 26811,
26817, 26771, 26830, 26885, 26970

SPARK TIMING

26797, 26811, 26884, 26899, 26915, 26960,
26967, 27002

SPECTROMETRY

26824, 27022, 27025, 27028, 27032, 27034,
27038, 27040, 27045, 27052, 27054, 27069,
27071, 27075, 27079, 27084, 27098, 27141,
27144, 27149, 27156, 27166, 27171, 27151,
27262

SPECTROPHOTOMETRY

26792, 26831, 26919, 27018, 27022, 27025,
27027, 27029, 27013, 27036, 27042, 27045,
27052, 27079, 27081, 27089, 27096, 27099,
27151, 27204

SPINACH

27242

SPORES

27048, 27239

SPOT TESTS

27231

SPRAY TOWERS

26968, 26973, 26974, 26975, 26978, 27010

SULFITES

SPRAYS

26793, 26821, 26916, 26997, 27122, 27152

STABILITY (ATMOSPHERIC)

27095, 27106, 27113, 27114, 27120, 27126,
27148, 27143

STACK GASES

26782, 26791, 26799, 26801, 26804, 26805,
26769, 26812, 26814, 26830, 26841, 26842,
26852, 26854, 26855, 26857, 26862, 26863,
26867, 26870, 26873, 26875, 26876, 26877,
26878, 26880, 26881, 26882, 26887, 26888,
26889, 26891, 26893, 26905, 26906, 26907,
26909, 26919, 26921, 26925, 26927, 26928,
26930, 26932, 26934, 26935, 26939, 26942,
26944, 26946, 26952, 26958, 26968, 26972,
26973, 26974, 26975, 26976, 26978, 26980,
26981, 26847, 26848, 26983, 26984, 26994,
26999, 27001, 27003, 27004, 27005, 27006,
27010, 27016, 27026, 27011, 27029, 27030,
27037, 27046, 27014, 27050, 27063, 27065,
27066, 27068, 27070, 27072, 27082, 27110,
27126, 27127, 27105, 27147, 27150, 27256,
27257, 27266, 27276, 27284

STACK SAMPLING

27016, 27029, 27030, 27036, 27039, 27014,
27072

STACKS

26782, 26800, 26805, 26842, 26866, 26875,
26933, 26935, 27088, 27110, 27119, 27121,
27126, 27127, 27105, 27147, 27266, 27284,
27285, 27293

STATE GOVERNMENTS

27253, 27271, 27280, 27287, 27288

STATISTICAL ANALYSES

26890, 27108, 27109, 27111, 27195, 27212,
27221, 27222, 27280

STEAM

26812, 26877, 26893, 26898, 26916, 27175

STEAM ENGINES

26827, 26828, 26829

STEAM PLANTS

26768, 26800, 26814, 26837, 26841, 26854,
26875, 26917, 26918, 26927, 26928, 26935,
26980, 27169

STEEL

26789, 26805, 26826, 26854, 26865, 26921,
26939, 26975, 26976, 26979, 26995, 27188,
27245, 27248, 27249, 27269

STOMACH

27185

STONE

26803

STRATIFIED CHARGE ENGINES

26817, 26774

STREETS

26829, 26853, 26992, 27041, 27074, 27086,
27085, 27106, 27146, 27221, 27222

STRONTIUM COMPOUNDS

27139

SULFATES

26918, 27036, 27099, 27100, 27118, 27136,
27170, 27243, 27246

SULFIDES

26781, 26768, 26819, 26820, 26881, 26882,
26888, 26844, 26925, 26936, 26940, 26944,
26950, 26965, 27004, 27009, 27022, 27026,
27053, 27069, 27070, 27081, 27125, 27150,
27170, 27276

SULFITES

27136, 27229, 27240

SULFONIC ACID

SULFONIC ACID 27229

SULFUR COMPOUNDS

26781, 26768, 26788, 26789, 26804, 26819,
26820, 26855, 26861, 26870, 26876, 26880,
26881, 26882, 26888, 26902, 26907, 26913,
26918, 26844, 26925, 26936, 26940, 26944,
26950, 26957, 26965, 26980, 27001, 27004,
27009, 27022, 27026, 27036, 27053, 27069,
27070, 27079, 27081, 27099, 27100, 27118,
27125, 27136, 27157, 27150, 27165, 27167,
27170, 27188, 27229, 27240, 2743, 27246,
27255, 27270, 27273, 27276, 27279

SULFUR DIOXIDE

26778, 26798, 26800, 26805, 26808, 26820,
26836, 26867, 26929, 26941, 26972, 26848,
26983, 26984, 26990, 26991, 26993, 26999,
27001, 27006, 27009, 27019, 27022, 27026,
27040, 27042, 27043, 27049, 27053, 27056,
27069, 27070, 27087, 27088, 27094, 27097,
27098, 27100, 27101, 27106, 27110, 27112,
27113, 27115, 27121, 27125, 27126, 27127,
27136, 27141, 27143, 27160, 27170, 27212,
27218, 27223, 27225, 27227, 27228, 27229,
27235, 27236, 27237, 27240, 27242, 27243,
27245, 27249, 27251, 27271, 27284

SULFUR OXIDES

26778, 26798, 26799, 26800, 26805, 26808,
26820, 26833, 26836, 26842, 26867, 26923,
26929, 26932, 26941, 26972, 26848, 26983,
26984, 26990, 26991, 26993, 26999, 27001,
27006, 27009, 27019, 27022, 27026, 27040,
27042, 27043, 27049, 27053, 27056, 27069,
27070, 27077, 27087, 27088, 27089, 27090,
27094, 27095, 27097, 27098, 27100, 27101,
27106, 27110, 27111, 27112, 27113, 27115,
27119, 27121, 27125, 27126, 27127, 27136,
27141, 27142, 27143, 27147, 27160, 27167,
27170, 27212, 27218, 27221, 27223, 27225,
27227, 27228, 27229, 27235, 27236, 27237,
27240, 2742, 27243, 27245, 27249, 27251,
27255, 27271, 27272, 27276, 27279, 27284,
27268

SULFUR OXIDES CONTROL

26781, 26785, 26799, 26800, 26804, 26823,
26837, 26852, 26854, 26855, 26856, 26857,
26861, 26867, 26870, 26871, 26873, 26876,
26880, 26881, 26882, 26887, 26888, 26891,
26893, 26907, 26917, 26918, 26844, 26920,
26921, 26923, 26925, 26927, 26928, 26932,
26933, 26935, 26940, 26944, 26945, 26950,
26957, 26965, 26972, 26973, 26974, 26975,
26976, 26977, 26980, 26848, 26983, 26984,
26987, 26989, 26995, 27006, 27022, 27036,
27037, 27088, 27154, 27149, 27255, 27256,
27252, 27257

SULFUR TRIOXIDE

26805, 26929, 26932, 26972, 26983, 26991,
27006, 27070, 27095, 27167, 27242

SULFURIC ACID

26833, 26855, 26891, 26907, 26925, 26927,
26932, 26944, 26959, 26972, 26980, 26991,
27036, 27046, 27093, 27112, 27160, 27246,
27271

SURFACE COATING OPERATIONS

26810, 26821, 26853, 26895, 26996, 27092

SURFACE COATINGS

26769, 26869, 26895, 26908, 26911, 26937,
26961, 26962, 26963, 26964, 26979, 26986,
26988, 26996, 27092, 27220, 27244, 27250,
27251, 27253

SURFACE PROPERTIES

26895, 26897, 26904, 26936, 26941, 26969,
27156, 27168, 27171, 27151, 27175, 27243

SURVEY METHODS

27019, 27072, 27101, 27135, 27292

SI-12

AIR POLLUTION ABSTRACTS, MAY 1973

SUSPENDED PARTICULATES

26793, 26802, 26804, 26810, 26812, 26818,
26820, 26841, 26851, 26854, 26856, 26858,
26859, 26865, 26875, 26894, 26896, 26898,
26902, 26907, 26916, 26923, 26947, 26950,
26953, 26972, 26976, 26977, 26983, 26849,
26995, 26999, 27002, 27007, 27020, 27012,
27029, 27047, 27050, 27063, 27078, 27081,
27087, 27090, 27093, 27095, 27096, 27108,
27110, 27112, 27114, 27123, 27131, 27132,
27134, 27136, 27137, 27141, 27143, 27146,
27152, 27153, 27159, 27160, 27169, 27170,
27192, 27232, 27234, 27269, 27271, 27284

SWEDEN

27014, 27154

SYNERGISM

26821, 27180, 27181, 27199, 27211

SYNTHETIC FIBERS

26900, 27244

T

TAR

26820, 26896, 26950

TAXATION

26995, 27266, 27291

TEMPERATURE

26784, 26788, 26795, 26797, 26811, 26812,
26814, 26774, 26830, 26902, 26919, 26933,
26845, 26941, 26942, 26948, 26955, 26965,
26968, 26969, 26975, 26985, 26991, 26999,
27026, 27043, 27046, 27070, 27073, 27125,
27160, 27165, 27171, 27175, 27178, 27243

TEMPERATURE (ATMOSPHERIC)

27091, 27103, 27112, 27116, 27119, 27128,
27130, 27134, 27148, 27140, 27141, 27142,
27223, 27225, 27239

TEMPERATURE GRADIENT

27148

TEMPERATURE SENSING INSTRUMENTS

27169

TENNESSEE

26841

TENSILE STRENGTH

26969

TEST ENGINES

26797, 26802, 26771, 26879, 26885, 26886,
26890, 26896, 26922, 27264

TETRAETHYL LEAD

26777, 26835, 27262, 27270

TEXTILE MANUFACTURING

26849, 27244, 27271

TEXTILES

26900, 26903, 27244, 27271

THERMAL RADIATION

26801, 26811, 26814, 26874, 26918, 27148,
27271

THERMODYNAMICS

26941, 27175

THERMOMETERS

27169

THRESHOLDS

27033, 27037, 27044, 27080, 27183, 27187,
27191, 27200, 27213, 27215, 27228, 27285

THUNDERSTORMS

27128

TIMED FUEL INJECTION

26817, 26818, 26839, 26884, 26915, 26960,
26998, 27000

TIN

26848

TIP BURN

27234

TISSUE CULTURES

27226, 27229

TISSUES

27187, 27204

TOKYO

27086, 27085, 27100, 27104, 27106, 27113,
27114, 27131, 27132, 27134, 27143, 27192

TOLUENES

27131, 27132, 27161

TOPOGRAPHIC INTERACTIONS

27117, 27119, 27126, 27128, 27135, 27225

TOXIC TOLERANCES

27189, 27218, 27220, 27223, 27226, 27240,
27261, 27263

TOXICITY

26808, 26821, 26826, 26903, 27021, 27069,
27132, 27180, 27181, 27182, 27183, 27186,
27187, 27189, 27191, 27193, 27198, 27199,
27200, 27201, 27203, 27205, 27207, 27211,
27213, 27214, 27215, 27216, 27217, 27218,
27220, 27224, 27225, 27226, 27229, 27230,
27234, 27236, 27237, 27240, 27219, 27261,
27263, 27270

TRACE ANALYSIS

27031, 27083, 27157, 27204

TRACERS

27106, 27268

TRACHEA

27194, 27209

TRADE ASSOCIATIONS

27278, 27288

TRAINS

26790

TRANSMISSOMETERS

27029, 27066, 27141

TRANSPORT

27119, 27168, 27193, 27194

TRAPPING (SAMPLING)

27048, 27069, 27076

TREATED FABRICS

27062

TREES

26794, 26984, 27221, 27222, 27231, 27232,
27235

TRIPHENYLENES

27041

TRUCKS

26790, 26813, 26827, 27086

TUMORS

27204, 27211

TUNNELS

27041, 27115

TURBIDIMETRY

26771, 27124

TURBULENCE (ATMOSPHERIC)

27091, 27148, 27105

SUBJECT INDEX

U

ULTRAVIOLET RADIATION

27112, 27142, 27158, 27160, 27161, 27178, 27199

ULTRAVIOLET SPECTROMETRY

27022, 27025, 27098

UNITED STATES

27071, 27246, 27262, 27280, 27283, 27291

UPPER ATMOSPHERE

27134

URBAN AREAS

26780, 26782, 26805, 26815, 26821, 26829, 26841, 26842, 26909, 26992, 27051, 27054, 27074, 27078, 27079, 27086, 27087, 27088, 27089, 27090, 27085, 27093, 27094, 27095, 27096, 27097, 27098, 27099, 27100, 27102, 27104, 27106, 27107, 27111, 27112, 27113, 27114, 27115, 27116, 27119, 27120, 27121, 27122, 27123, 27124, 27126, 27127, 27129, 27131, 27132, 27134, 27148, 27141, 27143, 27145, 27147, 27188, 27199, 27209, 27210, 27212, 27216, 27221, 27222, 27227, 27228, 27231, 27232, 27234, 27235, 27249, 27265, 27272, 27273, 27279, 27284, 27292

URINALYSIS

27187, 27195, 27201, 27216, 27217, 27240

USSR

26788, 26791, 26830, 26831, 26833, 26877, 26932, 26950, 26985, 27007, 27025, 27026, 27055, 27068, 27083, 27091, 27108, 27164, 27167, 27174, 27191, 27179, 27213, 27247, 27261, 27263

V

VALLEYS

27126, 27225

VANADIUM COMPOUNDS

27006, 27193

VAPOR PRESSURE

26938, 27136, 27243

VAPOR RECOVERY SYSTEMS

26792, 26854, 26914, 26949, 27001

VAPORS

26812, 26820, 26877, 26893, 26898, 26916, 27025, 27031, 27142, 27175

VEGETABLES

27224, 27227, 27228, 27229, 27230, 27234, 27236, 27241, 27242

VENTILATION

26851, 26871, 27103, 27115

VENTURI SCRUBBERS

26850, 26852, 26854, 26954, 26968, 26976

VISIBILITY

27050, 27066, 27122, 27134, 27141

VISIBLE RADIATION

27112, 27122, 27123

VOLATILITY

26938, 26999, 27167

VOLCANOES

27140

VOLTAGE

26767, 26894, 26902, 27005, 27077, 27247, 27250

W

WASHOUT

27119, 27136, 27246

WATER

26793, 26812, 26822, 26841, 26852, 26853, 26865, 26867, 26871, 26888, 26893, 26908, 26916, 26919, 26985, 26997, 26998, 26999, 27026, 27030, 27108, 27123, 27125, 27136, 27142, 27158, 27166, 27238

WATER POLLUTION

26801, 26820, 26834, 26852, 26854, 26887, 26888, 26921, 26946, 26951, 26977, 27004, 27246, 27271, 27280, 27282, 27283

WEATHER FORECASTING

27134

WEATHER MODIFICATION

26818, 27107, 27142, 27144

ZINC COMPOUNDS

WEST VIRGINIA

26940

WET CYCLONES

26871, 26974, 26976

WETTING

26793, 26803, 26953, 26997

WHEAT

27227, 27233

WIND ROSE

27121

WIND TUNNELS

27117, 27105, 27268

WINDS

26798, 26803, 26842, 27037, 27091, 27095, 27103, 27106, 27111, 27112, 27113, 27114, 27115, 27116, 27117, 27119, 27120, 27121, 27126, 27127, 27128, 27129, 27130, 27134, 27135, 27140, 27105, 27141, 27143, 27147, 27225, 27234

WOOD

26794, 26850, 26903

WOOLS

26900, 26903

X

X-RAYS

27031, 27079, 27081, 27157

XYLENES

27131, 27132, 27161

Y

YOKKAICHI

27131, 27147

YOKOHAMA

27079, 27104, 27132, 27212, 27221, 27222

Z

ZINC

26979, 27232, 27233, 27248, 27249

ZINC COMPOUNDS

26830, 26912, 26913, 27079, 27091, 27100, 27204, 27222, 27230, 27232, 27233, 27235

AUTHOR INDEX

A

ABE E 27231
ABE K 27241
ADAMS R J 27024
AGRAWAL R K 27135
AKAMATSU T 26931
AKHTYCHENKO A M *26788
AKIYAMA T *26874
AL OMAR A F *27152
AOYAMA T 27078
ARITA Y *26875
ARKHIPOV N A 26877
ARSENTYEV V V 26877
ASAKUNO K *27153, 27056
ATSUKAWA M *26876
AVDEYENKO A N *26877

B

BABIL S 27159
BACSO N *27107
BADAYEV V V *27108
BADE E *26878
BAGGE L P *26789
BAKER A *26879
BAKER S P *27181
BAKHANOVA R A *27023
BAKHAR F 27152
BALANOV V G 26950
BALL F J *26880, *26881
BARETTA E E *27182
BARICH R 27080
BARKLEY W 27184
BARNEA M *27183
BARSKIY V D 26833
BARTLETT J T *27024
BASMADSHIEVA K 27214
BAUDON P *27109
BEAVON D K *26882
BELKIN Y A I 27007
BELOZOVSKIY A A *27025
BENGTSOON S 27154
BERGMANN K 26836
BERNHARDT W 26922
BHATTACHARYA B *27110
BILLET T *26883
BINDER P E 27177
BINGHAM E *27184
BIRKS N *27243
BJERLE I *27154
BLADES A T *27027
BLEE T J *26884
BLUMER W *27185
BOEKNE H 27041
BOERTITZ S *27223
BOETTGER W *26790
BOGOMOLOV YU P 27164
BOHNKE M *27011
BONCZYK P A *27149, *27028
BOND G C *27293
BONO Y 27097
BOYD A W 27177
BOZHKOVA S N *27186

BREISACHER P *26885
BROWN G N 26880, 26881
BROWN L F 27168
BRUER G G *26791
BRYCE SMITH D *27187
BUCHTA K H 27281
BUERKHOLE A *27012
BURKE D P *27255
BURNS J J 27189
BUSECK P R 27053
BUTLER J D *26886
BYALIK YE I 27007
BYRD J F *27274

C

CABAN R *26792
CAMPELL K 26896
CARNUTH W 27209
CECIL L K *26887
CECILIONI V A *27188
CHAIGNEAU M 27038
CHAPMAN T W 26792
CHATTOPADHYAY A *27155
CHEREMISINOFF P N *26888, *27275
CHIGUSA M 27100
CHRISTMANN K *27156
CHUAH H H 27230
COFFIN D L 27208
COLLINS L F 27066
CONNEY A H *27189
CONRAD G *26889
CONSTABLE R A 26799
CORLETT R C 26794
CORNER E S *26890
CORNETT C L *27029
COUGHLIN H B *27260
CRAIG T L *26891
CROSSGROVE G *26892
CROWLEY J B *27030
CRYNES B L 27252
CSATHY D G *26893
CURNICK J 27004
CURRIE W J *26793

D

D SILVA A P *27031
DAHNEKE B *27032
DALMON J *26894
DAMSKA L A *26895
DARTNELL P L *26896
DAVID J A T 26884
DAVIES C N *26897
DAVIS J E 26880, 26881
DAVIS R J *26898
DE LUMEN B 27190
DE PENA R G 27136
DEFEW C A *26794
DERNDINER H O *26899
DIETRICH H *26900
DIETZ R N *27013
DILLARD C J *27190
DIMITROV T I 27186

DIXON J P *27157
DMITRIJEV M T *27191
DMOKHOVSKIY V I *27091
DODD H C 27182
DOI M *27192
DORSET B C M *27244
DOUAUD A *26795
DRAVNIKS A *27033
DREW R D *26796
DROZDZ M 27201
DUBROVSKAYA F I 27261
DUFFY L J *26501
DUIR J H 26989
DURIE R A *26902

E

EBERAN EBERHORST R *26797
EBISAWA E 26813
EDA S *27111
EFFENBERGER E *26903, *26798
EGUCHI Y *26904
EIBERT W 26983
ELKIN H F *26799
ENDO A *26905, *26906
ERTL G 27156
EVERETT N R 26901
EXLEY R W 27208

F

FALKENBERRY H L *26907
FANT B T 26989
FARBER B *26908
FARMER W M *27034
FARNKVIST K 27154
FASSEL V A 27031
FELIU S *27245
FERNANDEZ MANZANO P 27245
FERON J *26800
FIFE J A *26909
FISHER R S 27181
FISHER T N 27182
FLACHSBART H 27032
FLETCHER B 27190
FLETCHER K 27196
FLINN J E *27193
FLISZAR S 27162
FOOTE R S *27092
FORSTER E J *26910
FORTIN C J *27158
FRANCISCO H L *26911
FRANZEN L F *26801
FROLOVNIY YU V 26833
FUERTIG H 27006
FUJIE K *27093
FUJIEDA Y 27231
FUJII H 27279
FUJII T *27035, *27112
FUJITA A 27051
FUJIWARA T *27234, 27035
FUKAYA K 27046
FUKAYA Y *27036
FUKI S 27046

FUKUCHI T

FUKUCHI T *27037
FUKUIE N 27076, *26802
FUKUOKA S 27143, *27113, *27114
FUKUOKA Y *27115, *27225
FUNABASHI N *27116
FUNASHIMA M 27143, 27113
FURUHAMA S *26912
FURUHASHI K 27242
FURUSE B *27117
FUSAMURA N *26803

G

GAESSLER W *27276
GAGLIARDI J C *26913
GARRETT R *26914
GARTRELL F E 26907
GAUVIN B *26915
GEORGH H W *27118
GERBER J C *27277
GIBSON R O *26916
GIFFORD F A JR *27119
GILCHRIST R E *26804
GILDENSKIOLD R S *27261
GIORDANO A M *27194
GIRY L *27038
GNYP A W *27039
GOLDBLATT R B 26815
GOLDWATER F 27074
GONCHAROVA Z S 26950
GOTO M *27120, *27094
GOTO T *26805
GRAEFE K *27121
GRAENZER W 27240
GRAVENHORST G 27118
GREER S T *26769
GREGORY S A *26806
GRILLOT R *27040
GRIMMER G *27041
GRUDEN D 26797
GUILLEN M A 27245
GUNDERMANN K O *27226
GUSEV M I 27261

H

HA V 27142
HAAGER K *26917
HAAS T *27195
HAENEL G *27122
HAMAMOTO H *27095
HAMMOND A L *26807, *26918
HANAI Y 27161
HANNIKER G *26919
HANSON G P 27238
HANSON R C 27053
HARADA T *26844
HARNETT C G *26920
HARRIS F S JR *27123
HARRISON H *27124
HARTKOPF G *27278
HARUKI T 27103, 27199
HASEGAWA Z 26931
HATANAKA H 27112
HATTORI S 27095
HAYASHI M 27097
HAYASHI Y 27035
HAYNIE F H 27251
HAYSOM D W R *26921
HEITLAND H *26922
HENDRICKS C D *27159
HEPPLESTON A G *27196
HERBERT J 27124
HERMANN A A 27182
HERRMANN G *27042

AI-2

AIR POLLUTION ABSTRACTS, MAY 1973

HETTICHE H O *26808
HEWSON D L 27243
HICKS W A 26885
HIGUCHI F 27212
HIKICHI H 27111
HILDEBRANDT E *26923
HIRAI Y *27043
HIRAIWA S 27097
HIRANO A *26924
HIRASAWA M 26971
HIRONO T 27153
HIROSE K 27146
HIRSCHBERG E H 26948
HOFFMANN R *27197
HOFMANN D J 27140
HORIMOTO Y 27131, 27132
HORIUCHI K 26926
HORN K *27158
HOSHIKA Y *27125
HOSHINO M *27099
HOSHINO Y *27227, *27228, *27126, *27127
HOSKO M J 27182
HOWARD G P *26809
HUNT N 26884
HUNTER W D JR *26925

I

ISO S B *27128
IIDA Y 26969, 26824
IKEMORI K 26971
IMAGAMI K 26991
IMAI T 27097
INGRAM R S 27128
INOUE A 27081
INOUE E 26969, 26824, 27112
INOUE T *27279
INUGAMI M 27058
INUKAI T 27097
IRIE K 27104
ISAWA R *26926
ISHIBASHI K *26927
ISHIGURO T *27044
ISHIHARA S 27072
ISHIKAWA H 27224
ISHIKAWA N *27045
ISHIKAWA Y 27116
ISOZAKI M 27045
ITAYA K 27099
ITO E 27078
ITO H 27111
ITO M 27143, 27129, 27113
ITO T 27161
IVANCHENKO L V 27023
IVANCHIKOV A K 26791
IVERACH D 26812
IVLEV L S 27091
IZUMI K 27129
IZUMIGAWA T 27056

J

JAKIMTSHUK P P 27191
JARRETT S R *27280
JAUMANN R 27185
JAWORSKI U 27080
JERVIS R E 27155
JIKIHARA S 27120, 27094
JINZO Y 27232
JIRACEK V *27229
JO E 26802
JOHN M K *27230
JOHNSON N M *27246
JONAKIN J *26928
JONES C R 27206

JONES L G *26810
JULIEN M 27142

K

KAJI H 27131, 27132
KAJIM *27129
KAJITANI T 27097
KAMATA M 27117
KAMINO R 27234
KAMIYA A *27096
KAMRA A K *27130
KANABROCKI E L 27204
KANASHIMA Y 27232
KANAZAWA A 27095
KANBE R *26929
KANEDA K *27231
KANISHI Y 27035
KAPLAN E 27204
KARIM G A *26811
KASAHARA M *27160
KASTENHUBER H 27150
KASUYA M 27134
KATAKIRI Y *27046
KATELL S *27256
KATO S 26994
KATO T *27131, *27132, *27161
KATTAWAR G W *27133, 27138
KAWAIS 27146
KAWAMURA T *27134
KAWARAYA T 27103, *27199
KAWASAKI K 27171
KAWASE Z 26984
KEMPEN H W J *26770
KENT G R *26930
KHRAMOV L F 27247
KHROMYKH G I 27167
KIFUNE I 27061, 27062
KILLINGMO O H *27014
KIMOTO T *27047
KIMURA K 27104
KIMURA N *26931
KING G *27200
KIRCHGESSNER M 27240
KIRCHNER K *27150
KIROV N Y *26812
KIRSCH H *27281
KITA D 27129
KITABATAKE M 27147
KITSON P W 27277
KITTRELL J R 27067
KLUTSCH G *27162
KNUTSON D M *27048
KOBAYASHI H *26813, 27077
KOBAYASHI I *27097
KOCH H 27150
KODAMA F 26942
KOGURE N 26991
KOLOMIYETS L P 26950
KOMURO K 26971
KONDO M 27099
KONNO K 27104
KONO H 27095
KOSMIDER S *27201
KOSTIR J 27229
KOUSAKA Y 26954
KOUTSOUKOS E P 26949
KRAL H 27150
KRAUS W *26814
KRENKEL A R *26815
KRETOWA W A 27191
KROENING J 27140
KROETZSCH P *27163
KROTKOV F G 27263
KROTOV N S 26932
KRUEGER W 27006

AUTHOR INDEX

KUBASIK N P *27202
KUBOTA K 26969, 26824
KUBYSHEV N N *26932
KUDRYAVTSEV V S 26791
KUMAR K S *26816
KUNTSCHER V *26817
KURE F 27116
KURIBAYASHI A *26933
KURITSYN S I 26877
KURODA S 27216, 27217
KURODA Y *26845
KUROSAKA Y 27112
KUROSAWA A 27236
KURZ G *26934
KUSAKABE M 27045

L

LA MANTIA C R *26935
LACKNER M 27080
LAKTIONOV A G *27164
LAMPE F W 27173
LAND J S 26940
LANG C R 26948
LANGBERG S 27190
LANGE K *26771
LANGFORD M J *26936
LANTZ R B *27135
LEICHNITZ K *27049
LEONARD M H *26937
LESCHONSKI K *27015
LEVIN A A 27193
LEVINE D G *26938
LEVSHUNOV R T *27247
LIESEGANG W *26939
LIKENS G E 27246
LING J T *27282
LIPPITZ J *27098
LLOYD P *26818
LONGOSZ E J 26938
LOONAN D V 27239
LOPAYEVA N P 27167
LORENZI L JR *26940
LORSCH H G *26772
LOTTMAN R P 26816
LUCAS D H *27050
LUDYGA K 27201
LUEDERITZ P *27203

M

MA Y H *26941
MACHACKOVA I 27229
MACHE K 27195
MACHE W 27195
MACHIDA J 27232
MACKILLOP A *26773
MAEGAWA K 27104
MAEHARA S *26942
MAIO P 27206
MAKINO K 27100
MAMURO T *27051
MANCER C 26941
MANDADZHIEV I H 27186
MANLEY L W *26943
MANN E L *26944
MANN M J 26794
MAPLE R E *26819
MARKARYAN K H S *27179
MARKS G E *27204
MARKS V E *26820
MARSHALL R W *26846
MARTELL E A 27139
MARX W F 27288
MARZAHN D 27080

MASEMORE W C 27181
MASUDA K 26905, 26906
MASUDA T 27279
MATHESON G *26821
MATSUDA H 26959
MATSUDA Y 27051
MATSUMOTO M 26991
MATSUMOTO T 26875
MATSUO K 27081
MATULA J P *26945
MATZ J *27205
MATZKUHN G 26839
MAUGH T H H *26822, *27052
MCCULLOCH R C 27135
MCELROY J L *27148
MCKINNEY C M *27165
MCLEISH G *26946
MCNERNEY J J *27053
MEAKIN J C *26947
MEGUERIAN G H *26948
MEHTA D C *27252
MERCER T T 27075
METROPOLSKAYA V M 26950
MEYERS R A 26940
MEYSNER R V 26932
MICHAELIS T B *26949
MICKELSON G A 26989
MIKHAYLOV N F *26950
MIKI H 27097
MILANESI A A *27206
MILLER J M *27136
MILLER L B *26951
MISIEWICZ A 27201
MITANI K *27099
MITCHELL G E *26952
MITSUGI H 27231
MITSUZAWA S 27178
MIURA M *26953
MIYAI J 27056
MIYAMOTO F 27116
MIYAMOTO S 27218
MIYAZAWA K *27267
MIYOSHI T *27232
MIZOGUCHI I *27100
MIZOHATA A 27051
MIZUI T 27120, 27094
MIZUKAMI K 26984
MIZUTANI H 27096
MOHLER J B *27248, *27249
MOLNAR I. 26838
MONAHAN K *27166
MOORE C E 27204
MOORE H E 27139
MOREL W C 27256
MORI M 27057, 27058, 27056, 26803
MORISHIMA N *26954
MORITA H 27056
MORIYAMA S 27094
MORRIS W E *26955
MORROW P E 27194
MORTENSON J R *26956
MOSIC A *26957
MOWERY C L *26958
MURATA H 27111
MURATA M 27147
MUROZUMI M *27054

N

NABESHIMA Y 26924
NAGAOKA S 27218, *27207, 27192
NAGATA T 27153
NAGAYAMA T *26959
NAKADOI T 27035
NAKAGAWA T 27097
NAKAGAWA Y *27233

PETRYANOV I V

NAKAGISHI S 27035
NAKAMURA H *26960, *26961, *26962,
*26963, *26964
NAKAMURA K 26991
NAKAMURA Y *26774
NAKANO M 27035
NAKASHIMA H 27057, 27058
NAKATANI S 27035
NAMIKAWA Y 27036
NAOI Y *26965
NAWATA H *27283
NEWCOMER J L *26966
NEWTON P E 27182
NICHOLS R J 26885
NIKOLAYEV A M 26791
NIMMO N M 26775
NISHIKAWA Y 27035, 27112
NOBLES E J *26823
NONAKA Y 26954
NONHEBEL G *27284, *27285
NOVIKOV A A 27247
NOVIKOVA I S *27055
NOVITSKIY N V *27167
NOZAKI K 27065

O

OBERDORFER P E *26967
OCHI N *26968
ODAIRA T 27113, *27056, *26969, *26824
OESTER Y T 27204
OETTERER D *26970
OGAWA A *26971
OGAWA M 27099
OGIMA I 27216, 27217
OGINO F 26904
OHIRA T 27153, 27143
OHKI T *26972
OHSAWA M 27100
OIWA M *26973
OKA K 27112
OKA M 27199
OKADA Y *26974
OKI T *26975
OKITA T *27057, *27058, *27059, *27060,
*27061, *27062
OKUNO T *27063
OMATA H *27168
OMORI K 27241
ONNEN J H *26976
OPALKO S *26977
ORSOS S *27064
OSHIMAN T *27065
OSHINA T 27216, 27217
OTA H 27129
OTA M *26978
OTA Y *27234

P

PAINTER D *26825
PAL S *27169
PALMER J D *26979
PALMER M S *27208
PAUKERT T T *27066
PAULSON C A J 26902
PAVANELLO R *26826
PEDDER M A *27137
PENKETT S A *27170
PENNY N *26827
PEPIN T J 27140
PERVUKHINA I V 27055
PETERSON D H *27262
PETERSON J E 27182
PETRYANOV I V *27263

PIEHL F J

PIEHL F J 26901
PINIGIN M A 27213
PLASS G *27138
PLASS G N 27133
PLUMLEY A L 26928
POET S E *27139
POETZL K 27209
POND J B *26828
POPOV A A 26950
POTTER B H 26891
POTTER E C 26902
PRICE A R 26819
PRICE S J W 27039
PRITCHARD J M 27128
PRUZANSKY J 27013
PUT Y 27289

Q

QUINLAN C W *27067

R

RADWAY J E *26980
RAKOWSKY F W 26948
RAMAZZOTTO L J 27206
RANFT K 27240
RANFT H 27223
RAO K B 26888
RASCH R *26981
RASMUSSEN R A 27176
REDDY K 27190
REH L 27003
REICH T 27185
REICHELT W *26847
REIFSNYDER W E 27141
REITER R *27209
RENNER R A *26829
REPIK A J 26880, 26881
REYNOLDS F *27101
REYNOLDS R C 27246
RICARD L P 27038
RIES K M *26982
ROBINSON W G *27250
ROHRBACK D 26980
ROSA E J 27066
ROSEN J M *27140
ROWLAND L *27257
ROYAL M J *26775
RUCKELSHAUS W D *27264, *27286, *27287
RUSANOV A A *27068
RYZHOVA I K 27055

S

SAGAN J 27201
SAITO K *27210
SAITO T 27129
SAKAI K *27069
SAKANO H 26874, 27097
SANDER J *27211
SARUTA K 27212
SASAKI K 26842
SATO T 27210
SATO Y 27100, 27210
SAVIN S 26957
SAWANAKA K 27237
SCHACKMANN H *26848
SCHAFFRATH H *27070
SCHALLER K H 27195
SCHOCK D N 26948
SCHUBERT U 27080
SCHWARTZ W *26983
SCHWARZBAUER G 26797

SCHWEINSBERG F 27211
SCHWINKOWSKI K 27281
SEKIZAWA T 27192
SEMOVA A YU 27091
SENZAKI K *27171
SEVCIK J J 26901
SHAPOSHNIKOVA E YU 27083
SHAPRITSKIY V N *26830
SHEVCHENKO P F 27083
SHIBUKAWA S 27234
SHIMAMURA K *27071
SHIMIZU M *27072
SHIMOGATA S *27105
SHIMOMURA F 27232
SHINOZAKI M *27235
SHIOYA M 27116
SHIPMAN R H 26789
SHIRASAWA T *26984
SHISHIDO M *27212
SHISHIGURA M 27129
SHLEINIKOV V M *26985
SHREVE R F *26986
SHTEYNBERG A M 26877
SIDORENKO G I *27213
SIMONS E L *27288
SISSELMAN R *26987
SKLYAR M G *26831
SLACK A V 26907
SLONOVA L A 27055
SMITH C S 26913
SMITH J D 27013
SMUTEK M *27172
SNELLING D R 27158
SOBOLEV M A 26985
SOCTT D *26832
SOKOLOV V Z *26833
SOPHER I M 27181
SOWINSKI E J *27073
SPENCE J W *27251
SPRIGG W A *27141
ST PIERRE C C 27039
STAEHR R 27281
STASSEN J *27289
STEIGERWALD B J 27260
STEINBERGER E H *27074
STEINER J 27039
STEMMER K 27184
STEPANOV E N 27083
STEVENS C H *26849
STEWART A C *26988
STEWART R D 27182
STINSON L E 26910
STOEHR W *27075
STUCKEY A N *26989
STUPPEL M *27214
SUBBOTIN YU V 27025
SUFFET I H 27073
SUGAI R 27231, 27061, 27062
SUGANO S 27046
SUGAWARA K 27105
SUGIMOTO T *27076, 26802
SUGITA T 27212
SUGIYAMA M 27161
SUGIYAMA S 27175
SUITA H 27079
SUKEGAWA N 27212
SUKHOVA O F 26833
SUZUKI N *27236
SUZUKI S *26990
SUZUKI T 27192
SWARTMAN R K *27142
SYMON K *27215

T

TAGAWA R 27043

AIR POLLUTION ABSTRACTS, MAY 1973

TAGUCHI K 26813, *27102, *27077, 27112
TAJIMA N 27112
TAKAHASHI K 27160
TAKAHASHI M 27160
TAKAHASHI T 27097, 27077
TAKAKUWA H 27210
TAKATA K 27233
TAKAYAMA O 27218
TAKEUCHI S *27078
TAKEUCHI T 27051
TAKEYA S 27279
TAKEYAMA T 26905
TAKEYAMANT 26906
TAKIZAWA Y *27216, *27217
TAMORI Y *26991
TAMURA H 27147
TAN H S *27173
TANAKA S 26924, 27242
TANEMURA T *27079
TANI M 27279
TANIGUCHI Y 27129
TANIYAMA T *27237
TAPPEL A L 27190
TARASOV V I 27025
TARDIF A 27158
TAYLOR M E 26811
TAYLOR P 27184
TAYLOR S 27190
TEPLY S *26992
TERADA H *26993
TERMAN A V 27263
TEVEROVSKIY YE N 27263
THORNE L *27238
TIDY D 26894
TOHATA H *26994
TOMINAGA Y 27077
TOMIYAMA K *26995
TOMITA K *27103, 27199
TOOGOOD J B *26996
TORRENCE S L 26880, 26881
TOSHIRO H 27279
TOYOO K 27096
TOZAWA T 27241
TRAUFFER W E *26997
TRICKETT D B *26834
TRUITT J 26898
TSUBAKI J 27097
TSUCHIYA H 27099
TSUJI M 27063
TSUJIKAWA T 27147
TSUJIMOTO T 26813, 27077
TSUJIMURA K *26998
TSUJINO Y 27035
TSUNEMI M *26835
TSUNETOSHI Y 27218

U

UDAGAWA M *27143
UEKIS 27043
ULTEE C J 27028
UNLAND M L *27151
UNZELMAN G H 26910
URASHIMA M *27268
URRIBARRIN 27190
USSAR M B *26830
UTAWAGA M 27113

V

VAELL R P 26882
VALENTIN H 27195
VAN DER LINDEN S *26837
VAN NICK L J 26940
VAN SICKELS M J 26823

AUTHOR INDEX

VANLAERHOVEN C J 27230
VELDHUIS K H *27290
VIDA M *26838
VINSON D J 26916
VLASYUK O I *27174
VOIGTSBERGER P *26839
VOJINOVIC V 26957
VOLOSIN M T 27202

W

WADA C 27236
WADA O *27218
WADDINGTON J N *26999
WAGGONER A P 27124
WALDER C J *27000
WALLIN J R *27239
WALTERS R M *27001
WARBURTON J A *27144
WATANABE F *27175
WATANABE H 27192
WATANABE Y 27216, 27217, 27279
WAUCHOP T S 27166
WEAVER E E 26913
WEIGAND E *27240
WEINBERG H N 26945

WEISSMAN W 26945
WESTBERG H H *27176
WETTIG K *27080
WHITNEY D J 27142
WIESNER R *27002
WIGG E E *26840
WILDE G *27003
WILKINS E M *27145
WILLIS C *27177
WILLOUGHBY E *27004
WILSON M J *26841
WINGELSDORF H 27080
WINKLER H *27005
WINTON J M *27291
WOLFF *27006
WRIGHT J P 26925
WYATT I 27196

Y

YAGI Y 27116
YAGYU H 27100
YAMADA Y *27081
YAMAGA M *27241
YAMAMOTO K 27071

ZOCKEL M

YAMANAKA S *27146
YAMASAKI H 26802
YAMAZOE F *27219
YANAGASE S 27175
YANEV E I 27186
YANKOVSKIY S S 27068
YANOVSKIY L P *27007
YASUOKA T *27178
YATABE T *27082
YATAZAWA M *27242
YEFREMOVA L S *27083
YOSHIDA B *27008
YOSHIDA K *27147, *27084
YOSHIDA T 26954
YOSHIKAWA G *27009
YOSHIMURA K 27112
YOSHINO M *26842
YOSHINO S 26994
YOSHIWARA T 27104
YOSHIZAWA S *27104
YOSHIZUMI K 26969, 26824
YOUNG L G 27144

Z

ZENZ F A *27010
ZERWAS M 27184
ZHURAVLEV Y E V 27025
ZOCKEL M *26843

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48473	48475	48476	48477	48478	48479	48480	48481	48482	48483	48484	48485	48486	48487
48489	48490	48491	48492	48493	48494	48495	48496	48497	48498	48499	48500	48501	48502
48503	48505	48506	48507	48508	48509	48511	48512	48513	48514	48515	48516	48517	48518
48519	48520	48521	48522	48523	48524	48525	48526	48527	48528	48529	48530	48531	48532
48533	48535	48536	48537	48538	48539	48540	48541	48542	48543	48544	48545	48546	48547
48548	48549	48550	48551	48552	48553	48554	48555	48556	48557	48558	48559	48560	48562
48563	48564	48565	48566	48567	48568	48569	48570	48573	48574	48575	48576	48577	48578
48579	48580	48581	48582	48583	48584	48585	48586	48587	48588	48589	48590	48591	48592
48593	48594	48595	48596	48597	48598	48599	48601	48602	48603	48604	48605	48606	48607
48608	48609	48610	48612	48613	48614	48615	48616	48617	48618	48619	48620	48621	48622
48623	48624	48625	48626	48627	48628	48629	48630	48631	48632	48634	48635	48636	48637
48639	48640	48641	48642	48643	48644	48645	48646	48647	48648	48649	48650	48651	48652
48653	48654	48655	48656	48657	48658	48659	48660	48661	48662	48663	48664	48665	48666
48667	48668	48669	48670	48671	48673	48674	48675	48676	48677	48678	48679	48680	48681
48682	48683	48684	48685	48686	48688	48689	48690	48691	48692	48693	48694	48695	48696
48697	48698	48699	48700	48701	48702	48703	48704	48705	48706	48707	48708	48709	48710
48711	48712	48713	48714	48715	48716	48717	48718	48719	48720	48721	48722	48723	48724
48725	48726	48727	48728	48729	48730	48731	48732	48733	48734	48735	48736	48737	48738
48739	48740	48741	48742	48743	48744	48746	48748	48749	48750	48751	48752	48753	48754
48755	48757	48758	48759	48760	48761	48762	48763	48764	48765	48766	48767	48768	48769
48770	48771	48772	48773	48774	48775	48776	48777	48778	48779	48780	48782	48783	48784
48785	48786	48787	48788	48789	48790	48791	48792	48793	48794	48796	48797	48798	48799
48800	48801	48802	48803	48804	48805	48806	48807	48808	48809	48810	48811	48812	48813

48814	48815	48816	48817	48818	48819	48820	48821	48822	48823	48824	48825	48826	48827
48828	48829	48830	48831	48832	48833	48834	48835	48836	48838	48839	48840	48841	48842
48844	48845	48846	48847	48848	48849	48850	48851	48852	48853	48854	48855	48856	48858
48859	48860	48861	48862	48863	48864	48865	48866	48867	48868	48869	48870	48871	48872
48873	48874	48875	48876	48877	48878	48879	48880	48881	48882	48883	48884	48885	48886
48887	48888	48889	48890	48891	48892	48893	48894	48895	48896	48897	48898	48899	48900
48901	48902	48903	48904	48905	48906	48907	48908	48909	48910	48911	48912	48913	48914
48916	48917	48918	48919	48920	48921	48922	48923	48925	48926	48927	48928	48929	48930
48931	48933	48934	48935	48936	48937	48938	48939	48940	48941	48942	48943	48944	48945
48946	48947	48948	48950	48951	48953	48954	48955	48956	48957	48958	48959	48960	48961
48962	48963	48964	48965	48966	48967	48968	48969	48970	48971	48972	48973	48974	48975
48976	48977	48978	48979	48980	48981	48982	48984	48985	48986	48987	48988	48990	48991
48992	48993	48994	48995	48996	48997	48998	48999	49000	49001	49002	49003	49004	49006
49007	49010	49017	49024	49027	49038	49047	49055	49059					